EPA REGION V ARCS PROGRAM

EPA Contract No. 68-W8-0093 Work Assignment No. 17-5L4J SEC Donohue Project No. 20026



12

VOLUME 2

DRAFT REMEDIAL INVESTIGATION REPORT APPENDIX A - BACKGROUND INFORMATION, AND APPENDIX B - TECHNICAL MEMORANDA (PHASE I)

HIMCO DUMP
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
ELKHART, INDIANA

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

APPENDIX A

BACKGROUND INFORMATION

Fit Results USGS Well Logs



ecology and environment, inc.

111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415 International Specialists in the Environment

> NARRATIVE SUMMARY HIMCO DUMP ELKHART, INDIANA

The Himco Dump site covers approximately 40 acres of former marsh land. The site is located at County Road 10 and the Napanee Extension in the Town of Elkhart, located in Elkhart County, Indiana. The site operated between 1960 and 1976 under the ownership of Mr. Charles Himes. A marshy area was excavated and general refuse, medical and pharmaceutical wastes were landfilled in the resulting hole. There is also a possibility that industrial waste was buried in the excavation.

The total amount of hazardous waste landfilled at the site is unknown. According to laboratory analysis of samples taken by Ecology and Environment FIT members during the site inspection of July 30, 1984, groundwater is contaminated with cobalt, selenium, beryllium, cadmium, copper, manganese, and other inorganic metals. The Rocky Mountain Analytical Laboratory performed the above analysis which corroborated earlier residential well sample analysis which showed high manganese levels. The site is located above a continuous portion of the local outwash aquifer system that is the sole source of drinking water for the community. A conservative estimate of 20,000 people may be affected by drinking water contaminated by the site.

In 1974, Mr. Himes was advised by the State Health Commissioner to drill deep wells for six local residences that were shown to have contaminated shallow wells.

In 1975, Mr. Himes signed a consent agreement (adopted by the Stream Pollution Control Board) that resulted in the closing of the landfill in September 1976. Much of the landfill was covered by sand.

Several leachate streams were visible during the site inspection of July 30, 1984 by the E & E FIT.

In 1980, the USGS conducted a hydrogeologic study of the area and this helped influence the installation by U.S. EPA of two interceptor wells to divert contaminated groundwater away from the North Main Street Well Field located approximately 1 1/2 miles south east of the site. The interceptor wells have NPDES permits and discharge into nearby Christiana Creek.

22Z:1T

DETECTED HETALS - 1984 Himco Dump Elkhart, Indiana

Units: ug/l (pph)

		,							:0f <i>E</i> :	site		*	Sed	iment
	Field	 Upgradie 	nt Wells -				Dup		Down G	rødient	Surla	ce Vater	Units:	mg/kg (ppm)
Analytes	Blank	D/19'	D/174'	E/17'	E/174'	H/24'	H24'	P/24'	1/32.	1/172.	UG	_DC_	UG	_DC_
Aluminum	•	12,500	•	350,000	-	296	269	175	1,890	•	•	•	1,640	424
Arsenic	•	26	-	200	•	•	•	26		•	•	•	1.8	2.0
Barium	•	121	•	803	165	172	175	97	414	66	•	. •	14	•
Roryllium	•	•	•	11	-	•	•	•	•	•	•	•	-	•
Cadmitum	•	•	•	10	-	•	•	•	•	•	•	•	•	•
Chromium	•	370	•	461	•	16	12	•	•	•	•	•	3.9	1.3
Cobalt	•	•	• ;	132	•	•		•	•.	• .	•	•	2.7	•
Copper	•	73	•	555	•	•	•	•	•	•	•	•	3.9	•
lron	•	67,400	1,230	146,000	1,580	12,300	14,800	11,400	5,520	507	246	210	4,380	1,550
Lead	•	73	•	401	•	7.7	9.0	6.7	•	•	•	•	5.8	1.6
Hanganese	•	1,630	158	2,150	41	331	320	182	133	24	24	12	43	103
Hercury	•	0.21	; •	1.4	•	•	•	•	•	•	•	•	•	•
Nickel	•	. 103	. •	422	. •	•	•	•	•	•	•	•	4.4	•
Selenium	•	•	2.0	. 14	•	•	•	4.7	•	•	•	•	•	•
Tin	· •	•	•	•	32	•	•	•	•	55	•	•	1.1	1.2
Vanadium	•			326	•	•	•	•	•		•	•	•	•
Zinc	11	164	38	1,630	44	274	309	58	18	~55	65	•	19	5

- - Not detected at or above contract required detection limit.

UG - Upgradient

DG - Downgradient X/YY' - Well/sampling depth in feet.

ARCS/P/HIHCO/ABB

DETECTED ORGANICS - 1984 Nimco Dump Elkhart, Indiana

Units: ug/l (ppb)

Compound	Field Blank	Upgradic	ent Vells D/174'	E/11.	E/174'	<u>H/24</u> *	Dup <u>H/24</u> *	P/24 ·		radient 1/1/2°	Surface UG_	Vater _DG_	Sedim Units: ug <u>UG</u>	
<u>Volatiles</u>										•				
Acetone Benzene 2-Butamone Chloroethane Ghlorofluoromethane Dichlorodifluorometha 1,1-Dichloroethane Trans 1,2-	32 5 K	39 5 K	39 5		164 5 K 106 43 J 61 J	60 5 K 57 J 79 J	100 5 K 79 37 J 56 J	230 4 13 38 J 14 J	5 K		. 5 K	5 K	492 G	66 G 10 K
Dichioroethene Dichylether 1,4-Dioxane			•		8 .	. 9	7	44 J 9 J	· .	•			45 J	78 J
Ethylbenzene 2-Hexanone Hethylene Chloride Toluene Trichloroethane Carbon Disulfide	5 K			5 K 5 K	5 K 5 K 5 K	5 3	5 K 5 K	5 K	5 K 5 K 5 K 1	5 K	15 C		319 C 10 K	249 C 10 K
Semi-Volatiles 1,2,4-Trichlorobenzem 1,4-Dichlorobenzeme	,			·	10 K			·	•		•			

K - Compound detected above instrument detection limit but below contract required detection limit.

J - Compound identified by computer library search, concentration estimated.

C - Associated lab blank contained detectable level, value reported has had blank level subtracted from it.

UG - Upgradient.

DG - Downgradient.

X/YY' - Wall/sampling depth in feet.

DETECTED ORGANICS - 1984 Illaco Dump Elkhart, Indiana (Continued)

Units: ug/l (ppb)

Compound	Field Blank	Upgradie <u>D/12</u> '	nt Wells <u>D/174</u> '	E/12'	E/174°	<u>H/24</u> *	Dup <u>H/24</u> *	P/24*	Offs Down Gr 1/35'		Surface UG_	Water _DG_	Sediment Units: ug/kg (ppb) <u>UG</u> DG
Naphthalene Di-N-Butylphthalate Accompthone 2,4-Dinitrotoluene N-Nitrosodinpropylam	10 K	10 K	10 K	10 K	15 25 K 20 K 9	10 K		10 K	10 K	. 10 K	10 K	10 K	
Pyrene Phenol 4-Hethylphenol Bls(2-ethylhexyl)		,	1		13	62 197	76 235						
phthalate Diethylphthalate Caprolactam Sulfur Dioctylester- hexanonedioic acid	10 K			10 K		10 K 224 J 39 J	266 C 145 J 41 J 1190 J	20	10 K				150 K 1180 J

Unknowns

Volatile fraction Semi-Volatile fraction

PCB/Pesticides

None detected

K - Compound detected above instrument detection limit but below contract required detection limit.

J - Compound identified by computer library search, concentration estimated.

G - Associated lab blank contained detectable level, value reported has had blank level subtracted from it.

NG - Upgradient

DG - Downgradient

ARCS/P/IITHCO/AB7

5 J

1390 J

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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317.

County in which well was drilled	WELL LOCATION (
Driving directions to the well location: Include County Road Names, Numbers, Subdivision Name, lot number, distinction Include Inclu		Fill in completely - Refer to instruction sheet) Ilkingt Clevelone
Well Owner C. S. Coological Survey Address 1810 °. "erician, Indiamarchis, Ind.	Driving directions to the well loc	ation: Include County Road Names, Numbers, Subdivision Name, lot number, distinct landmarks; etc. Tup. 381 H. 45 Sec. 36
Well Owner C. S. Coological Survey Address 1810 °. "erician, Indiamarchis, Ind.		
Well Owner C. S. Coological Survey Address 1810 °. "erician, Indiamarchis, Ind.		
Name of Well Drilling Contractor: Crt-an Prilling, Tax. Address T17 E. Falfalfa Roal, Fokore, Indiana Name of Drilling Equipment Operator: Edck G., Lovell C., Pan F., Frank C. WELL INFORMATION Depth of well: Diameter of casing or drive pipe: Diameter of liner (if used): Diameter of Screen: Length: 475 ft. to bottom of screen 475 ft. to bottom of screen For Public Supply Stock Method of Drilling: Cable Tools Rotary Rev. Rotary Jet Bucket Rig Static water level in completed well (Distance from ground to water level) Pumping Test: Hours Tested Air Rate Air Rate Ortenan Prilling, Tax. Total Length, Indiana Solo Size: ACC 1. 6, 1977 Double Cot. 6, 1977 Double Cot. 6, 1977 Double Cot. 6, 1977 Total Length: Slot Size: ACC 1. 6, 1977 Double Double Cot. 6, 1977 Double	•	· · · · · · · · · · · · · · · · · · ·
Name of Well Drilling Contractor: Total Length: Stock Driven Other	Well Owner U. S. C.	colopical Survey Address 1819 ". "eridian, Indianapolis, Ind.
Name of Drilling Equipment Operator: Name of Drilling Equipment Operator: Edob (i., Lovell C., Dan F., Frank (.)	Building Contractor	Address
Name of Drilling Equipment Operator: Name of Drilling Equipment Operator: Edob G., Lovell C., Dan F., Frank C.	Name of Well Drilling Contractor	Crtran Brilling, Tree.
WELL INFORMATION Depth of well:	<u>_</u>	
WELL INFORMATION Depth of well:	·	Fick G., Lowell C., Dan F., Frank C.
Depth of well:	Name of Drining Equipment Ope	•
Diameter of casing or drive pipe: Diameter of liner (if used): Diameter of Screen: Hength: Length: 10ng Slot Size: 475 ft. to bottom of screen 475 ft. to bottom of screen Type of Well: Drilled Gravel Pack Use of Well: For Home Test Test For Industry Rev. Rotary Jet Bucket Rig Static water level in completed well (Distance from ground to water level) Bailer Test: Hours Tested Rate g.p.m. Drawdown ft. (Drawdown is the different between static level and water level) Pumping Test: Hours Tested Air Rate Go g.p.m. Drawdown ft. (Drawdown is the different between static level and water level) Drawdown ft. (Drawdown is the different between static level and water level) Drawdown For Public Supply Stock For Public Supply Stock Drawdown For Public Supply For Public Supply Stock Drawdown For Public Supply F	WELL INFORMATION	
Diameter of casing or drive pipe:	Depth of well: 496	Date well was completed:Cct. 6, 1977
Diameter of liner (if used in 31 long Total Length: 005 12 W. botton as Slot Size: 007 SF W. top server 475 ft. to bottom of screen 495' to bottom of pipe Type of Well: Drilled		EN TIC
Diameter of Screen: Length: 175 ft. to bottom of screen 175 ft. to bottom of pipe 175 ft. to bottom of screen 175 ft. to bottom of pipe 175 ft. Test of the screen 175 ft. Test of pipe 175 ft. Test		en la la
Type of Well: Drilled		J. 10th
Use of Well: For Home Test For Industry For Public Supply Stock Method of Drilling: Cable Tools Rotary Rev. Rotary Jet Bucket Rig Static water level in completed well (Distance from ground to water level) 6.5 fee Bailer Test: Hours Tested Rate g.p.m. Drawdown ft. (Drawdown is the different between static level and water level) For Public Supply Stock Public Supply	<u> </u>	475 ft. to bottom of screen 495' to bottom of pipe
Static water level in completed well (Distance from ground to water level)		
Static water level in completed well (Distance from ground to water level)	Method of Drilling: Cable T	ools Rotary Rev. Rotary Let Bucket Rig
Bailer Test: Hours Tested Rate g.p.m. Drawdown ft. (Drawdown is the different between static level and wat level at end of test) Pumping Test: Hours Tested Air Rate g.p.m. Drawdown ft. (Drawdown is the different between static level and wat level at end of test)		
Pumping Test: Hours Tested Air Rate 60 g.p.m. Drawdown ft. between static level and wat level at end of test)	•	
Signature O: Imm Dullein Lau.		منس اسم المنتف وأورينه والمنافقة وال
Ontohan 201 3 and	•	Signature Dilma Dullain fac.
Date	•	Date

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	FORMATIONS (Color, type of material, hardness, etc.)	From	To	5	نگ ر	7	8 (1)
٠ ٢_	fine to med. sand & gravel	0	· 30	cation	Field Located	Торо Мар	COUNTY :
.	ved. to coarse sand o gravel	30	48	acce	cated	þ	Υ .
<u></u>	fine to red. sand v/er e mayel	48	160	Location accepted w/o verification by		-	
	fine to med. gravel w/sree sand - finer at bottom	160	740)o ver		\ ;	[·:]
	red. pravil w/scre sand	?40	275	fication		- -] .
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<u> </u>	med. provel w/some end	370	318				
· (.	fine to med. gravel	318	375	23.6	Date		
•	fine gravel & sand	375	4(5			.	TWP:
٣.	med. rrevel & broken stone	.762	475		7		
w (:-	fine to med. gravel & broken stone	475	489				2
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T -	brown siltatone	492	496	1 1	1	1	FOR ADMINISTRATIVE USE ONLY (Well drifter does not fill out) RGE. 46 M. K.
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U. S. GEOLOGICAL SURVEY WRD - INDIANA COMPOSITE LITHOLOGIC LOG

. WATA FROM DRILLER'S AND GAMMA LOGS).

PROJECT:	FL KHART	County:	FI KHART	••••
WELL # E	31:	INTERPRE	TATION BY:	A.Martin
DATE: 4/3	30/79.		•••••••	**** ***
FORMATION	· · · · · · · · · · · · · · · · · · ·		FROM	To
Sand	& Graze	73.25	0	/ <i>3</i> 'a
Clay			132	135
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5,17-	rand & Grave	13545	292	357
5,,			307	487
Soul	2 1	:	427	472
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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204

INDIANAPOLIS, INDIANA 46204
Telephone 633-5267 Area Code 317

WELL LOCATION (I	Fill in completely - Refer to	instruction sheet)Civil Township	Cleveland
Driving directions to the well loca	Induda Course Days		ision Name, lot number, distinctive UF Sec. 36
About 1/2 Hi. W. of Nappar	nee St. on Co. Rd. 10 al	bout 1/8 M1. K. of i	io N. Well
			·
NAME OF WELL OWNER and/o			les Indianamalia Ind
Well Owner U. S. Cec	ological Survey Add	dress	ian, Indianapolis, Ind.
Building Contractor	Ad		
Name of Well Drilling Contractor	Ortman Drilli:	ng, Inc.	
1 Address	717 S. Yalfali	fa Road, Kokomo, In	iana
C_{I}	Rick O.	, Frank G., Lowell (Dan E.
Name of Drilling Equipment Ope	rator:		
WELL INFORMATION			•
	Data wal	l	Cct. 4, 1977
Depth of well: 355			
Diameter of casing or drive pipe:		Total Length:	
Diameter of liner (if used):		Total Length:	_
Diameter of Screen: 2"	Length:51 long	Slot	Size: _018 SC WW to bottom of screen
Type of Well: Drilled 🔼	Gravel Pack		Other
(Use of Well: For Home	Test For Industry	For Public	Supply Stock
Method of Drilling: Cable To	ools Rotary 🗗 F	kev. Rotary Tet	Bucker Rig
Static water level in completed we	ell (Distance from ground to	water level)	6.7 Seet
1	Rate 8.1		
Pumping Test: Hours Tested_			
r.			
C ir	Signati	October	27, 1977
	Date_		

FOR ADMINISTRATIVE USE ONLY (Well driller does not fill out)

COUNTY Elkinart Subdivision Name Oscoola FI W of EL Ground Elevation_ By U.S.G.S. Date 1000000 FIN of SL. Field Located Depth to bedrock_ =2650 FLE OF WL. Courthouse Location By ___ Bedrock elevation. 20.50 FISORNL Location accepted w/o verification by ___ Lot Number. Aquifer elevation _____ 230 355 235 255 33 R 153 156 159 38 2 33 K 151 154 161 욁 195 ٩ 228 230 255 305 235 139 159 160 8 22 0 135 K 153 R 151 154 128 161 55 Fron sandy FORMATIONS (Color, type of material, hardness, etc.) shale clay (sandy) Sander rravel w/some troken Fravel fine to med. sand & come gravel (204) 8 cley र्थ ०% १ fine gravel gravel 730 Pri troundsh gray - 100 streaks 35 medium sand & pravel Band clay brounish fray clay chance med. sand Sand ggrid w/some screen brown clay med. sand w/sore sendy brown clay clay brown-fray clay 3t5. Jts. med. to coarse ravel PTE7 sand & gravel brounish gray sand & gravel to red. fine to med. 祖の祖 w ₩ ~ Bond send Send bettom of fire sand & some brownish 10 hrs. 0510 MOTE: sandy fine sand zed. Sand

WATER WELL LOG

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· WATER WELL L	oc		,	<u> </u>
FORMATIONS (Color, type of material, hardness, etc.)	From	To	Con Fig.	8
fine brown sand & gravel	0	18	Topo Map	COUNTY
fine to med. gravel	18	49	aled accep	7
gritty sandy gray clay	49	52	Cation ted w	/
fine to med. sand & gravel w/otreaks of gray o	1 5 52	168		5
med. sand & gravel w/sand .	168	174	Realio	カスドイ
blue shale	174	185	a b a a a a a a a a a a	•
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6 jts. 160 PSI (20+)				
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U. S. GEOLOGICAL SURVEY WRD - INDIANA, COMPOSITE LITHOLOGIC LOG

WATA FROM DRILLER'S AND GAMMA LOGS)

PROJECT: FLICHART	COUNTY:	FI KHART	
WELL # D-2	INTERPRE	TATION BY:	9 Miss
DATE: 4/30/79	· · · · · · · · · · · · · · · · · · ·	••••••	
FORMATION		FROM	To
Sand & Gravel "	46.3	O	42
Clay		46	50
Sand & Grave!	124 3	50	174
Shale	:	124	125
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		•••••	
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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA

E. Tet Hot

STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317

WELL LOCATION	(Fill in completely - Re	fer to instruction shee	 ct)
County in which well was drill	ed Elkhart	Civil Town	nshipCleveland
Driving directions to the well l	Include County	Road. Names, Numbers,	, Subdivision Name, lot number, distinctions R. 4E Sec. 36
About 800 %. of Nam	panee St. on N. side	of Co. Rd. 10 - Sc	outh Fole
NAME OF WELL OWNER and			
Well Owner U. S. C.	eological Survey	_ Address No.	Meridian, Indianapolis, Ind.
Building Contractor		_ Address	
Name of Well Drilling Contract	or:Ortnen D	brilling, Inc.	
Address	717 S. Y	alfalfa Road, Koko	omo, Indiana
Name of Drilling Equipment O	perator:	Rick C., Frank G.,	, Lovell C., Dan E.
WELL INFORMATION	•		
Depth of well: 315	Dec		Oct. 10, 1977
-			
			:
Diameter of liner (if used):	• •		· ·
Diameter of Screen:none	Length:	·	Slot Size:
Type of Well: Drilled I	Gravel Pack	Driven _	Other
Use of Well: For Home] Test For Industr	ry 🔲 Fo	r Public Supply 🔲 Stock 🔲
Method of Drilling: Cable	Tools Rotary 🖪	Rev. Rotary	Jet Bucket Rig
Static water level in completed	well (Distance from groun	d to water level)	none
Bailer Test: Hours Tested	Rate	g.p.m. Drawdown	1ft. (Drawdown is the differe between static level and w
Pumping Test: Hours Tested	Rate	g.p.m. Drawdown	
	5	ignature	un Taillain San
	_		tober 27, 1977

COUNTY Elknari (Well driller does not fill out) **Subdivision Name** Topo Map Osceola 700 FI WOLEL By <u>U.S.G.S.</u> Date 10/1011 Depth to bedrock 303 Field Located FIN of SL. Ft E of WL. Courthouse Location By ___ Bedrock elevation. Location accepted w/o verification by ___ _Ft S of NL. Aquifer elevation ____ Lot Number 260 195 210 253 8 88 165 167 176 139 282 221 233 255 333 Ø 얾 197 0 9 8 165 176 210 960 88 167 195 197 199 33 233 253 255 8 B 젊 221 clay q v/streaks pravel FORMATIONS (Color, type of material, hardness, gray fine to ned. sand w/some sand w/some ravel Fravel gravel clay fine to med.broam rar fine to med. brown dirty sand gritty gray clay sandy gray clay Franite boulder gray ned. sand Llue-rray र्वेट्ट med. fire to med. fine to med. blue shale clay clay gray fine clay gray clay gray clay Fray clay 4 brs.

FOR ADMINISTRATIVE USE ONLY

WATER WELL LOG

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F - #.5

DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANABOLIS INDIANA 46204

INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317

WELL LOCATION (Fill County in which well was drilled	ll in completely - Refer to	instruction sheet)	Csolo	
Driving directions to the well locati	ion: Include County Road landmarks, etc.	Names, Numbers, Subdi Pup. 38N R. 51' S		mber, distinctive
On N. sd. of Tr. Rt. 19 w	here Rd. starts to cur	rve to S. E. Well		
	······································			
NAME OF WELL OWNER and/or			ian Indianonol	ie Ind
Well Owner U. S. Geold	Ad	dress	IM, Indianapol	
Building Contractor	Ad	dress		
Name of Well Drilling Contractor: .	Crtmen Drilling	, Inc.		
Address		Road, Koromo, Indi	ana	
Name of Drilling Equipment Operate	Rick O	Frank G., Lovell C	., Dan E.	
WELL INFORMATION		L.		
Depth of well: 225	Date wel	ll was completed:		
Diameter of casing or drive pipe:	5" PVC	Total Length:	186	
Diameter of liner (if used):	·	Total Length:		·
Diameter of Screen:	51 long		.018 SS W	y e.
Type of Well: Drilled X	Length: 2 Screen: Gravel Pack [Driven Driven	5' to botton of Other	screen .
Use of Well: For Home 7	Test For Industry	For Publi	c Supply 🔲	Stock 🔲
Method of Drilling: Cable Too	ls Rotary 🗗 R	ley. Rotary 🔲 🛚 Jet	Bucket Rig	
Static water level in completed well	(Distance from ground to	water level)	15.4	feet
-	Rate 2.1		fr. Drawdows	is the difference
	ir 30 8.	•		atic level and water
•	Signat	ure Orban D	mil wing for	<u> </u>
	•	October	a	- /

FOR ADMINISTRATIVE USE ONLY (Well driller does not fill out) TWP. 38N RGE SE SWALL WVW SEC 31 Subdivision Name Topo Map. 1992 FIN of SL. Depth to bedrock 220 Field Located Courthouse Location By _ _____ Date _ _FIE of WL. Location accepted w/o verification by __ FIS of NL. Lot Number. Aquifer elevation ___ 8 S 17 33 8 13 156 22 220 225 From 0 2 156 220 ដ 23 137 212 E 8 WATER WELL LOG FORMATIONS (Color, type of material, hardner (20t) gravel Band sand med. to coarse sand 8 160 Frey cley w/streaks med. sand & gravel Eray fine dirty send soft fray clay 7 jts. Jts. fine to red. dirty blue shale 5 ray clay Fray clay blue clay ţ H ROTE: fine fine

U. S. GEOLOGICAL SURVEY WRD - INDIANA COMPOSITE LITHOLOGIC LOG

. (DATA FROM DRILLER'S AND GAMMA LOGS)

PROJECT: ELKHART	COUNTY:	ELKHART :	• • • • • • • • • • • • • • • • • • • •				
WELL # F-5	INTERPRETATION BY: A Marin						
DATE: 4/12 77		••••••••	••••				
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Theta Card	143	79:	93				
C137	•	93:	100				
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Sind - 'Clos	:	122	135				
Sand & Grove /	23.8	135	157				
Clay		158	76.6				
·Sins	1::}	166 T	767				
Clay		167 T	182				
South & Garal	13-3	182	/75				
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Clas.	. <i>U</i>	・2/2・	:2720" ·				
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6-3

DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317

NAME OF WELL OWNER and Well OwnerU. S. G	Include County Road Names, Numbers, Subdivision Name, lot number, distinctive landmarks, etc. Twp. 3EN R. 5E Sec. 31 dwardslurg Ave. 1 Flock, th. W. slout 150° on N. sd. N. Well
Well Owner _ U. S. G	l/or BUILDING CONTRACTOR
Well OwnerU. S. G	
	Control Currence Tell W Maridian Indianantis Ind
Building Commerce	Geological Survey Address 1819 N. Feridian, Indianapolis, Ind.
Building Contractor	Address
Name of Well Drilling Contracto	or:Ortman Drilling, Inc.
Address	717 S. Malfalfa Road, Kokomo, Indiana
Name of Drilling Equipment Of	perator: Rick O., Frank G., Lowell C., Dan E.
Diameter of Screen: Type of Well: Drilled X Use of Well: For Home Method of Drilling: Cable	Date well was completed: 5th PVC

U. S. GEOLOGICAL SURVEY WRD - INDIANA COMPOSITE LITHOLOGIC LOG

(DATA FROM DRILLER'S AND GAMMA LOGS)

PROJECT: ELKHART COUNTY: FLKHART					
WELL # G-3 · · ·	INTERPRETATION BY A. M. ST. 17				
DATE: 4/12/77			· · · ·		
FORMATION		FROM	To		
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Class	: :	55	63		
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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317

WELL LOCATION County in which well was dri	(Fill in completely - Refer to instruction sheet) edCivil Township
Driving directions to the well	ocation: Include County Road Names, Numbers, Subdivision Name, lot number, distinguished landmarks, etc. Tup. 38% R. 4E Scc. 36 St. on Rappanee St., th. W. 1/2 Flock on S. ad. W. Well
T FIDER II. OI : ISLAND	
	l/or BUILDING CONTRACTOR
Well Owner U. S.	Geological Survey Address 1819 N. Peridian, Indianapolis, Ind
Building Contractor _	Address
Name of Well Drilling Contra	
Address	•
Name of Drilling Equipment	Perator:
WELL INFORMATION	Oct. 13, 1977
Depth of well:	Date well was completed:
Di	Total Length:
Diameter of Screen:	Length: 2 Screens - 12' overall 172' to bottom of
Type of Well: Drilled	Gravel Pack Driven Other
Use of Well: For Home	Test For Industry For Public Supply Stock
Method of Drilling: Cab	Tools Rotary Rev. Rotary I Jet Bucket Rig
Static water level in complete	well (Distance from ground to water level)
Bailer Test: Hours Teste	Rate g.p.m. Drawdown ft. (Drawdown is the diffe
Pumping Test: Hours Teste	Air 100 Rate
. •	Signature <u>Ortober 26, 1977</u>
	October 26, 1977

U. S. GEOLOGICAL SURVEY WRD - INDIANA

COMPOSITE LITHOLOGIC LOG

THATA FROM DRILLER'S AND GAMMA LOGS) ...

PROJECT: FLIKHART	COUNTY:	FLICHART .	••••			
WELL # I - 2	INTERPRETATION BY: 411					
DATE: 4//2/27		•••••••••••	••••			
FORMATION	• • • • • • • • • • • • • • • • • • • •	FROM:	To			
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Sand	35	·89 ÷	92			
Sondy Clay	•	92	124			
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Grave	.93	784	193			
Shaie		·· 193 :	-19:			
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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317

WELL LOCATION)N (Fill in	completely - Re	fer to inst	ruction sheet)	}		
County in which we Driving directions to	il was drilled	municipa, etc.		_Civil Towns nes, Numbers, S Twp. 38:1	Subdivision N		er, distinctive
NAME OF WELL O	WNER and/or BUIL U. S. Geologic			1819 K. K	eridian, L	ndianapolis	, Ind.
	tractor						
Name of Well Drillin							
Address		717 S. Mal	falfa Ro	ed, Kolmmo,	Indiana	· · · · · · · · · · · · · · · · · · ·	•
Name of Drilling Equ		Pick	C., Tra	nk G., Love	11 C., Den	Ε.	
WELL INFORM	ATION	•	·				
Depth of well:	175	Da	te well was	completed: _	Cc+. 1	2, 1977	
Diameter of casing o	r drive pipe:			Total Length:_		149	
Diameter of liner (if	used):			Total Length:_			
Diameter of Screen:	L	ength:51			Slot Size:	040 S: WW	· ·
Type of Well: Dr	· ·				174.	to bottom o her	f screen
Use of Well: Fo	r Home 🔲 🏻 Test	For Indust	ry 🔲	For I	Public Supply	, 🔲 🔞	Stock 🔲
Method of Drilling:	Cable Tools	Rotary 🖸	Rev. R	Rotary 🔲	Jet 🔲	Bucket Rig [J
Static water level in (13.9		feet
Bailer Test: Ho	urs Tested	Rate	g.p.m.	Drawdown_	ft.	(Drawdown is	the difference
Pumping Test: Ho						between static level at end of	level and water test)
	• .	S	Signature _	Edma	- Dail	ling, L	·
		ı	Date	Octob	er 26, 197	7	

12/10/11 FOR ADMINISTRATIVE USE ONLY (Well driller does not fill out) COUNTY TWP. SKIN RGE NIN SULVES SEC 3/ Subdivision Name Ground Elevation 254 2350 FIW of EL ACCO FINOISL. Field Located Depth to bedrock. _FIE of WL. Courthouse Location By ___ _____ Date _____ Location accepted w/o verification by ______ _FIS of NL. Aquifer elevation _____ __ Lot Number_ 122 155 165 175 0 155 165 clay FORMATIONS (Color, type of material, hardness, etc.) rravel fine to med. send w/some pravel (tirk) Sand 160 Pf.I 160 Pr I q med. te cearre 5 blue shele elternste ned. sa∷d gray clay blue clay rray clay 3 hrs. NOTE:

WATER WELL LOG

U. S. GEOLOGICAL SURVEY WRD - INDIANA COMPOSITE LITHOLOGIC LOG

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CAMMA LOGS)	DRILLER'S, AND	MORT ATALL

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DIVISION OF WATER DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA STATE OFFICE BUILDING INDIANAPOLIS, INDIANA 46204 Telephone 633-5267 Area Code 317



Diving directions to the well location: Include Cou	Civil Township
landmarks,	etc.
NAME OF WELL OWNER and/or BUILDING CONT	
Well Owner	Address Address
Building Contractor	Address
Name of Well Drilling Contractor:	
Address	
Name of Drilling Equipment Operator:	2007 / 2)42 (00)
WELL INFORMATION	
	Date well was completed: = = /3 -2
Diameter of casing or drive pipe:	Total Acres 5
Diameter of liner (if used):	T' IS
Diameter of Screen: Length:	Slot Size:
りかっこうじん	Driven Other
Use of Well: For Home For Inc	dustry D For Public Supply D Stock
Method of Drilling: Cable Tools Rotary	Rev. Rotary I Jet Bucket Rig I
Static water level in completed well (Distance from g	round to water level)
Bailer Test: Hours Tested Rate	g.p.m. Drawdown ft. (Drawdown is the d
Pumping Test: Hours TestedRate	between static level at end of test) 8.p.m. Drawdownft. level at end of test)
	Signature

FORMATIONS (Color, type of material, hardness, etc.)	From	То	5	ဂ	Ţ.	7	<u>α</u> .	
לאריד לסטונים - לינד לינד	0	رن .	Location accepted w/o verification by	Courthouse Location By	Field Located	Topo Map.	COUNTY	
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Francis Cont. of Cont. Cont. Cont.	· 32	43	ificati		115	1/2	7.5	
GREY FINE SAND & MED GRAVER	43		on by		6		'	"
BTH	105				147			
				Date	Date	l		1337
AUGERS FILLED W/ FINE SAND					1		£	
PURHED # :3 SCREEN + GALVANI	252				K		1.0	23
PIPE IN SPENI MOLE TO 103'					3/2		BN	[~] 5
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County in which well was drilled	Include County R			Name, lot number, di
Oriving directions to the well location:	landmarks, etc.			
NAME OF WELL OWNER and/or BUI	LDING CONTRAC	TOR		
Well Owner		Address 12:3	11:50	231;
Building Contractor		Address		
Name of Well Drilling Contractor:	14x2=			
Address				
Name of Drilling Equipment Operator:	<u> </u>	<u>```-////₹१*'%</u>		
WELL INFORMATION		, i		•
Depth of well: 2295	Date	well was completed	: 4/3	9 79
Diameter of casing or drive pipe:	2 72	Total Lengt	h:	- /
Diameter of liner (if used):		Total Lengt		
Diameter of Screen: 2"	ength:5 '		Slot Size:	40
Type of Well: Drilled D	Gravel Pack	Driven [)	Other
Use of Well: For Home AUGER	For Industry	F	or Public Supp	ply Stock
Method of Drilling: Cable Tools	•	•	_	Bucket Rig
Static water level in completed well (Dis	tance from ground	to water level)	8.41	
Bailer Test: Hours Tested	Rate	g.p.m. Drawdow	nft.	(Drawdown is the d
Pumping Test: Hours Tested	Rate	_g.p.m. Drawdow	nft.	level at end of test)
	Sig	nature		
	_			

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P

County in which well was drilled	• • • • • • •		Civil Town	ship			
Driving directions to the well location:	Include County landmarks, etc.	Road Names	, Numbers,	Subdivision	Name, los	number,	distinctiv
	:	:					
NAME OF WELL OWNER and/or BUIL				<u> </u>			···
Well Owner		_ Address _	<u>'U'</u>	• ·	• : •	·	
Building Contractor							_
Name of Well Drilling Contractor:							
Address							
Name of Drilling Equipment Operator:	- 1 - 4179 12 EV)	<u>e / ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; </u>	<u> </u>			 <u>-</u> .	····
WELL INFORMATION				•			
Depth of well:	Dat	e well was co	ompleted:		· •	·	
Diameter of casing or drive pipe:	<u>ा निः कार</u>	То	tal Length:		· · · · · · · · · · · · · · · · · · ·	<u>.</u>	
Diameter of liner (if used):							
Diameter of Screen: L	ength:			Slot Size:	110		:
Type of Well: Drilled	Gravel Pack	1	Driven 🔲		Other		
Type of Well: Drilled [] OSCLEVATE Use of Well: For Home [For Industr	y 🔲	For	Public Sup	ply 🔲	Sto	ck 🔲
Method of Drilling: Cable Tools							
Static water level in completed well (Dis							fee
Bailer Test: Hours Tested					. (Draw	down is th	e difference
Pumping Test: Hours Tested					betwe	en static levels tend of test	el and water
	S	ignature					
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WATER WELL LOG

APPENDIX B

TECHNICAL MEMORANDA (Phase I Field Work)

*	T 1AT T	Son bornig and Monitoring Wen Instantion
	TM 2	Well Development of EPA Wells
	TM 3	Staff Gauge Installation
-	TM 4	Geotechnical Borings
	TM 5	Geotechnical Data Evaluation
	TM 6	Private Well Sampling and Basement Air Screening
-	TM 7	Landfill Cap Soil Sampling
	TM 8	Groundwater Sampling
	TM 9	Surface Water and Sediment Sampling
•	TM 10	Test Pit Excavation and Geophysical Exploration Program
_	TM 11	Slug Testing and Analysis
	TM 12	Waste Mass Gas Sampling
49	TM 13	Installation of Water Table Wells and Landfill Cap Sampling
	TM 14	Wetlands Assessment and Identification
	TM 15	Wetland Soil Sampling
	TM 16	Water Level Measurements
	TM 17	Health and Safety



TECHNICAL MEMORANDUM NUMBER 1

DATE:

January 16, 1991

TO:

Vanessa Harris, Site Manager

CC:

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TŠQAM

FROM:

Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.023

Himco Dump RI/FS

MONITORING WELL INSTALLATION

Introduction

Four deep groundwater monitoring wells were installed as described in Exhibit A, Field Sampling Plan Addendum to Volume 2, Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana. Drilling activities for these well installations began on November 27, 1990, and were completed December 15, 1990. These pi zometers were installed to provide groundwater samples for chemical analysis and water elevations to be used in groundwater flow analysis. Steve Padovani and Tom Puchalski of Donohue & Associates, Inc., inspected the drilling and well installation activities, completed qualitative logs based upon visual inspection of cuttings liberated during air rotary drilling, performed and documented air monitoring using a photoionization detector and gasponder, and completed well installation documentation forms and activity logs. Drilling and well installations were completed by John Mathes and Associates, Inc. (Columbia, Illinois), with a TH 60, Ingersol Rand air rotary rig.

Methods

Drilling and well installation methods were performed as described in Exhibit A, Field Sampling Plan Addendum to Volume 2, Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana, Section 4.2.

Air rotary drilling was used to advance boreholes prior to the installation of piezometers. A 7-7/8-inch tricone bit was advanced ahead of 8-inch driven steel casing. No samples were retained from these four borings for piezometer installations, but the Donohue geologist completed an approximate log as drilling progressed based upon visual inspection of drill cuttings.

Piezometers were finished at the following depths: P101B, 98 feet; P101C, 165 feet, P102B, 65.4 feet; and P102C, 159.5 feet. Their locations are provided in Figure 1.

A typical piezometer installation began with steam cleaning of the 2-inch diameter stainless steel well casing and plastic 1-inch diameter tremie pipe. Following steam cleaning, the 5-foot screen (Dietrich 2-inch I.D., flush-threaded, 0.010-inch slot, Schedule 5, Type 304 stainless) and riser (Dietrich 2-inch I.D., flush-threaded, Schedule 5, Type 304 stainless) were wrapped with teflon tape at the joints and threaded together before being lowered into the borehole. Enough 10-foot stainless steel sections were threaded together to allow a 2.5-foot riser stickup to extend above the ground surface. Excess stickup was cut off with a pipe cutter. In P102B, the annular space between the well screen and the borehole wall were backfilled with number 10-20 silica sand (Colorado Silica Sand, Colorado Silica Sand, Inc., Colorado Springs, Colorado) to 3.4 feet above the top of the well screen. P101B, P101C, and P102C were installed with natural formation sand which collapsed onto the well screen from 2 to 4 feet above the top of the well screen.

The placement of the filter pack was followed by the installation of a 2.5- to 3-foot thick bentonite slurry seal. From the bentonite seal to approximately 3 feet from ground surface, the annular space was backfilled with a cement/bentonite grout. A concrete collar was used to cement the protective casing (steel 4-inch diameter) in place. Vented, threaded PVC caps were installed at the top of the 2-inch risers. Protective casings were supplied with locking lids. Boring logs are provided in Appendix A. Well installation diagrams are provided in Appendix B.

Deviations

Intermediate piezometer P102B was installed at 65.4 feet rather than 100 feet since a silt and silty clay layer approximately 34 feet thick was logged beginning at approximately 65 to 70 feet while the boring for P102C was drilled. P102B was installed directly above this confining unit.

P102C was intended to be installed at 175 feet, however, a fine dense sand unit encountered at about 120 feet slowed down the rate of casing advance to less than 20 feet per hour. Very little water was being produced from this zone. Because driving casing became slowed to the point of futility, the well was installed at 159.5 feet by drilling beyond the 140-foot bottom of the 8-inch casing.

P101C was also intended to be installed at 175 feet, however, a large hole developed beneath the back of the rig by settling of sand during casing pounding. This problem, in addition to sand heaving up into the 8-inch casing, forced the installation to occur at 165 feet.

A natural formation sand was used in place of the specified filter pack sand in P102C, P101B, and P101C since sand immediately collapsed the borehole as the drill bit was removed. The 2-inch casing was installed beyond the bottom of the 8-inch casing by jetting water with a tremie pipe while allowing the weight of the 2-inch casing to sink it down to the previously drilled depth. Most of the jetted water circulated back up the 8-inch casing and was not lost to the formation.

Head pressures and loose formation sand also account for natural sand which blew up within the 8-inch casing before the bentonite slurry seal could be installed to the base of the 8-inch casing. Up to 2 feet of sand flowed up into the 8-inch casing prior to seal installation. Specific depths of seal placement are provided for each well in Appendix B.

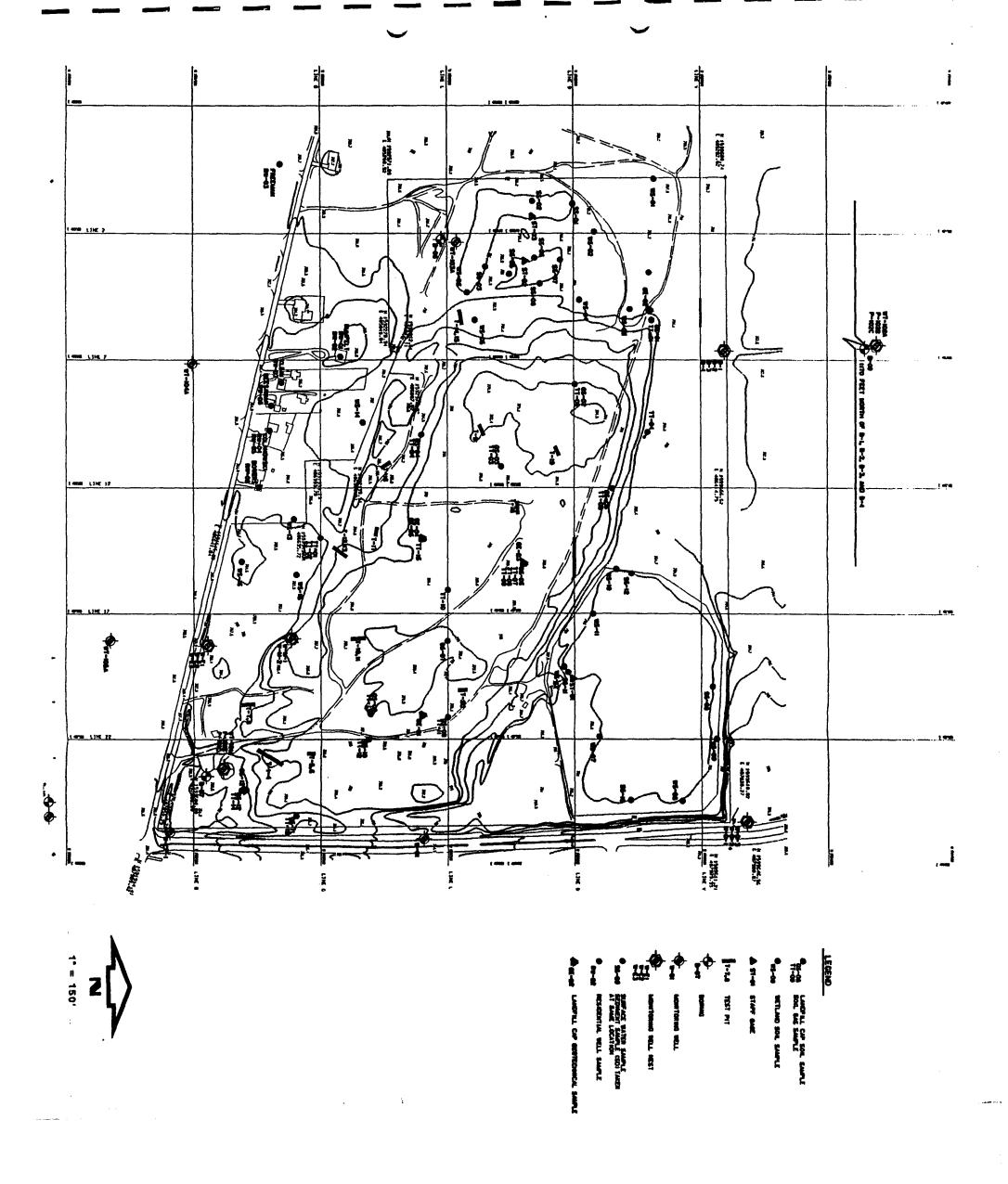
Summary of Results

No samples were retained for this task. The stratigraphy at these locations is provided by boring logs for water table well locations and geotech borings.

The most significant challenge to overcome during these well installations was due to sand heaving up into the 8-inch casing while well installations were being done. The rate of sand heaving was fast enough so that by the time the drill stem was broken and pulled from the boring, up to 70 feet of sand had heaved up into the 8-inch casing. This sand had to be removed prior to well installation.

The sand was cleared from the casing at P102C by jetting water down into the 8-inch casing as the 2-inch casing was installed. Sand and water circulated up and out of the 8-inch casing which allowed the 2-inch casing to drop. Once the sand was removed from the 8-inch casing, further jetting below the 8-inch casing allowed the 2-inch casing to drop below the 8-inch casing and, therefore, expose the 2-inch casing to the formation. This method was required to expose the screen below the 8-inch casing because attempts to pull the casing up were not successful. Shallower installations at P101B and P102B, however, were installed by pulling the 8-inch casing up while the 2-inch casing remained stationary. The installation at P101C required additional effort since the 8-inch casing could not be pulled up, and jetting was not successful beyond the bottom of the 8-inch casing. After two attempts at jetting the well in place, the boring was overdrilled 10 feet and then jetted. This third attempt was successful.

A/R/HIMCO/AH4



MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



APPENDIX A APPROXIMATE BORING LOGS

DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM Donohue SHOT HIMCO DUMP Date: 12/12/90 Project No. 20006 023 Well No. PICIC Inspected By: Tom Pick. lek. **Engineers & Architects** Driller/Contractor HAX TINNIN. DON PREWINGTON MATHES CONTUTER AIDED DESIGN/ORNETING Concrete Digmeter PROTECTIVE CASING GUARD POSTS 8" Typo Steel · Vented (es) No Type 5 dellowing 1-Diameter 4" Jes Antional Locked_ Length 6.01 KA 675 Protective Casing CAP OR PLUG Vented (Yes No Type PVC Length CONCRETE COLLAR Cement Thickness 3.0 Total Quantity. Manufacturer Rite Mix UPPER SEAL Powder/Granular/Pellets Duantity *Top 3 Hydrated of Grout Monatacturer Borehole 2". PIPE Type Stainless Steel Schedule 5 Type 30 Diameter. 10 feet No. of Sec. 16+1cuto Length/Sec. _ Thickness 150 Grout Bottom Manufacturer_Dietrick SEP whs ke Casing 158 Typo Cement / Rontonto 32/ Batches 10s. of TYPE IA Partland + HeW 165 Length 105. of Restaite Danter + Total Quant. gal s. Manufacturers Poitland - Lafarre Bestraite WYOF OUTSIDE BROUT TYPE AMOUNT + Top of Seal 53 ft. JOINTS Flush Threaded (eg/No. Teflon Toped Yes/No O-Ring Yes (No) Seal Thickness *Top of 156 ft. Dietrich Manufacturer___ Pack LOWER SEAL 10 lbs Powder Pettots Quantity___ *Top of 160 ft. Hydrated Slutry 10 gal., Time Manufacturer NATURALGEL WYD-REN PRODUCTS Effective Screen SCREEN Stainless Length Type Continuous Worn __ Schedule __5 : Screen Length/Sec._ __ No. of Sec. _ Length <u>* 1.0. 3.0</u> Bottom Screen 65 ft. Slot Size.... Vietnich Manufacturer_ Mater. *Boring 175 ft. FILTER PACK Type(s) Nother Formetica Thickness Source Fine GIM Sand Collapsed to 150th Measured From Monufacturer-Ground Surface Lengin \" PLUG CR CAP Type Strinles Borehole Digmeter MATERIAL NOTO - TEN - WE LINE - SM WATER SOURCE Fire Hydrand in front of Ellehor Water Wing

Donohue DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM Siter Himes Dump Project No. 20036.023 Well No. PIOIB Inspected By: Icm Puchalski Engineers & Architects Driller/Contractor Hax Tinnin Don Republicator / Mathes COMPUTER ALDED DESIGN/DRN/TINO Concrete Diameter PROTECTIVE CASING GUARD POSTS 13/1 Typo Steel Vented Yes No Type Steel Coment Locked Yes National fills Diameter 4" Length 6.01 Key . KA675 3.0 Protective Casing CAP OR PLUG Vented (eg/No Type PVC Lanath CONCRETE COLLAR Coment 165 1bs.+Water 13 5 agl. Thickness 4.0 Total Quantity_ gal. Manufacturer UPPER SEAL Hydroted Manufecturer Grout PIPE Type Staikles Stope Schedule 5 Type 30 Borehole 8" 10 feet Length/Sec._ No. Of Sec. Thickness 84 Bottom Manufacturer Dietnic cosinggi CROUT Type Cement Bentonite Parch 12/19 _ 10s. of Type IA Portland + Well 105. of bentonite pander + Length Total Quant. 150 Manufacturers Partland-Laufrange Bentanite with Br 80 gals. OUTSIDE CROUT Type AMOUNT_ * Top of 88 ft. JOINTS Flush Threaded (ES) No. Tefion Toped Yes No O-Ring Yes No _f1. *Top of 91 Manufacturer Dietrich Pack LOWER SEAL Powder Pellets Quantity 10 165 *Top of 93 ft. Hydroind Slurm .15 Manufacturer Naturalael WYOBEN PRODUCTS Effective SCREEN Screen Length Type_ Screen Length/Sec. 5 ft 5 No. of Sec. Length ٥.٥. <u>ع.</u>٣ <u>* 1.0. 2.0"</u> * Bottom Slot Size 1010 screen 98_f1. Manufacturer Dietrick Moter. *Boring Depth 100_ft. FILTER PACK Type(s) Natural Formation Thickness Boring collapsed on Measured From screen and out of 8" Ground Surface casing as it was pullegrenose Diameter PLUG OR CAP Type Stainless WATER SOURCE Fire hydrant in front of Elkhart Natural Formation

Donohue DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM Siter Himco Pamp ____ Date: 12/2/90 Inspected By: 5. Padevani Well No. PloaB _ Project No. <u>20036</u> Engineers & Architects Driller/Contractor Max Tinnin I Medles CONFUTER ALDED DESIGN/DRAFTING Concrete Diameter PROTECTIVE CASING GUARD POSTS Type Stee (Vented Yes Type lose fi Hed Diameter 4" Length 4 2,4 Protective Casing CAP OR PLUG Vented Yes No Type PVC Length CONCRETE COLLAR Comont 50 Ibs.+Water 5 agi. Concrete 3.c' Total Quantity.... Manufacturer # Top ۵f UPPER SEAL _ft. Seal -Powder/Granular/Pellets Quantity_ Seal *Top 3.0' ft. Thickness-Hydrated _____ ____gal.. Time __ of Manufacturer Crout PIPE Type Stainless Steel Schedule 5 Borehere Diagneter -0.D. 3%_" <u>| a </u>* Length/Sec. 10' - No. Of Sec. 6 Thickness 34.5 Bottom Manufacturer Diedrich GROUT Type_ Well 45.0 Length Ibs. of _gals. Water ____ Total Quant.___ Manufacturers -CUTSIDE GROUT Type Bantonike - Partland MIX AMOUNT good 40, 9 hase pertland (9410/leg). *Top Seal 54.5 ft. JOINTS Flush Threaded (es No. Teflon Taped (res No 0-Ring Yes/No *Top of 57.0 ft. Manufacturer Thickness Pack LOWER SEAL Bottom 58.44 Powder/Poliets Quantity_ *Top of 60.4 ft. Hydrated by formation water gal. Time 1100 Manufacturer <u>Lafares</u> Effective Screen Length Type Stanles Steel Screen Length/Sec. 6.8 Length 0.p.1 2'/4' **Bottom** Stot Size_10 _ No. Sicts/ft... Screen 65.4 ft. Manufacturer Diedrich Boring 66 ft. Mater. FILTER PACK Type(s) Natural grain WK40 . 3mm Thickness Source Czark Marchalas Volume _____ Manufacturer Ganton Mader of Measured From Ground Surface PLUG OR CAP Type Stainer Steel Length 15 Borenole Diameter MATERIAL WATER SOURCE Elbert MUNICIPALTY Sand + Granel

Donohue DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM Sites Himas Dump Dates 12/190 Well No. Plo2C Inspected By: S. Paderani Project No. 200 26 **Engineers & Architects** Driller/Contractor Max Tinnen / Muthes CONFUTER ALDED DESIGN/DRAFTING Concrete Diameter GUARD POSTS PROTECTIVE CASING Vented (es/6) Type Looie F.A.A. Type Steel Digmeter_4" Length __ H 3.0 Protective Casing CAP OR PLUC Vented Yes/16 Type_ Length CONCRETE COLLAR ___ibs.+Water 5 agi.___ Concrete Total Quantity_ Thickness Manufacturer *Top UPPER SEAL Powder/Granular/Pellets Quantity.... +Top 15 ft. Thickness Hydrated ___ ____gal., Time ___ OF GLOCAL Manufacturer PIPE Type Stainles Steel Schedule Borenole Digneter-Length/Sec. 10ft/sec. - No. Of Sec. 16 + 14 ub. Thickness [149 Grout Bottop Manufacturer Diedrich Casing CROUT Type___ ___ Ibs. of __ Well MIX__ 159.8 Length __ lbs. of ____ gals. Total Quant.___ Monufacturers -OUTSIDE SHOUT Type Coment benton to 9 MUF - Volclay AMOUNT 425741 * TOP 149 JOINTS Flush Threaded Yes No _ Tefion Taped (Yes/No O-Ring Yes/No Manufacturer_ Filter -LOWER SEAL 8" casing bettem 153.5 Powden/Pellets Quantity ~ 10 *Top of 54.5 Hydroted _gal..Time____ Manufacturer Lathige Effective SCREEN Screen Lenath Type to skel _ Schedule -5.0 Screen Cengin/Sec. DE DL. No. of Sec. / Length # Bottom Slot Size_10 No. Slots/ft. 180 Screen 159.5 ft. Manufacturer Diedi', Máter. *Boring 160 ft. FILTER PACK Type(s) Minitial Hatered 160 - 154 5 was 40 15 Thickness Source Chick Muntains Manufacturer General mederical * Mecsured From Ground Surface PLUG CR CAP Type Ster 1 Lengin 1.5" Borenole Dicmeter MATERIAL FINES WATER SOURCE Elkast - Hair St. Stution wicher treatment

BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: Himes Dumy PROJECT NO. 30036.033

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BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: Himco DumpPROJECT NO. 20026

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BORING LOG

- SOIL BORING NO.

Engineers & Architects

SITE: Hames Dunp PROJECT NO. 20026



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BORING LOG

SOIL BORING NO.

Engineers & Architects
COMPUTER ALDED DESIGNATION

SITE: Himco Dump PROJECT NO. 20026

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Engineers & Architects
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SITE: Himis Dung PROJECT NO. 20026.023

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TECHNICAL MEMORANDUM - NO. 2



DATE:

January 23, 1991

TO:

Vanessa Harris - Site Manager

CC:

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TŠOAM

FROM:

Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 175L4J Donohue Project No. 20026.024

Himco Dump

WELL DEVELOPMENT

Introduction

All newly installed groundwater monitoring wells at the Himco Dump site in Elkhart, Indiana, were developed a minimum of 24 hours after their installation. Water table wells were developed on November 13 and 14, 1990, and piezometers were developed December 15 and 16, 1990. Developed water table wells include WT101A, WT102A, WT103A, WT104A, WT105A, and WT106A. Developed piezometers include P101B, P101C, P102B, and P102C. The locations of these wells are provided in Figure 1 of this memorandum. Water table wells were developed by John Mathes & Associates, Inc., and Eric Slusser of Donohue & Associates, Inc. Piezometers were developed by Max Tinnin and Don Brewington of John Mathes & Associates, Inc., and Tom Puchalski of Donohue & Associates, Inc. Wells were developed to remove sediment from the well and to allow the maximum amount of groundwater to enter the well for groundwater sampling. Well development helps assure that a representative groundwater sample is obtained.

Methods

Well development was carried out as specified in the <u>Final Field Sampling Plan</u>, <u>Himco</u> Dump Remedial Investigation/Feasibility Study Elkhart, Indiana, Section 4.2.2.3.

The development method for water table wells was different from the development method for piezometers. Water table wells were pumped by hand using a Brainard Killman hand pump.

Piezometers were developed using compressed air provided by the TH60 drill rig. An air purging device developed by John Mathes & Associates, Inc., was used. This device consists of a compressed air line attached to a tube directed down into the well which takes an 180-degree bend upward into the base of a 1-1/2-inch I.D. plastic water hose. The air lifts the sand and water up through the plastic hose. This method was used for these deep

wells because a high volume of water and sand was required to be removed in a short amount of time.

Pumps with sufficient pumping rates are not available for 2-inch wells. The air developer served to remove the sand from the well and purge the groundwater in a reasonable amount of time.

Pumping of the well continued until at least five well volumes were removed and the purge water was silt free, the water temperature was stabilized to $\pm 0.5^{\circ}$ C, pH was stabilized to ± 0.1 units, and conductivity was stabilized to ± 10 percent.

Measurements of pH, conductivity, color, temperature, and turbidity were recorded at least once after each of the five well volumes were purged.

Deviations

High pressure hot water washing of the Brainard Killman hand pump and the air development pump was used for decontamination between wells instead of soap and water, isopropanol, and deionized water as was described in Section 4.2.2.4 of the sampling plan. The lengths of PVC connections and lengths of the exit hose and air compressor hose were not easily cleaned by hand. The high pressure hot water wash provided a quicker and more thorough method of decontamination for this equipment.

The sampling plan specified using a submersible pump for well development. The air development device used by Mathes for the development of the piezometers was used in place of a submersible pump. No submersible pump is available which could pump out the sand and purge the groundwater as quickly from a 2-inch well as did the air development tool.

Summary of Results

Copies of completed field forms are provided in Appendix A. The development methods successfully cleared the sand and silt from the installed groundwater monitoring wells and removed the required purge volumes so that a representative groundwater sample could be collected after the wells had stabilized for a minimum of two weeks. All groundwater wells provided sufficient groundwater volume to conduct groundwater sampling.

TP/ds

A/R/HIMCO/AA9

APPENDIX A WELL DEVELOPMENT DATA

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TECHNICAL MEMORANDUM - NO. 3

DATE: January 21, 1991

TO: Vanessa Harris, Site Manager

CC: Marcia Kuehl, RI Lead

Roman Gau, Project Manager

Mike Crosser, TSQAM

FROM: Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 175L4J Donohue Project No. 20026.024

Himco Dump

STAFF GAUGES

Introduction

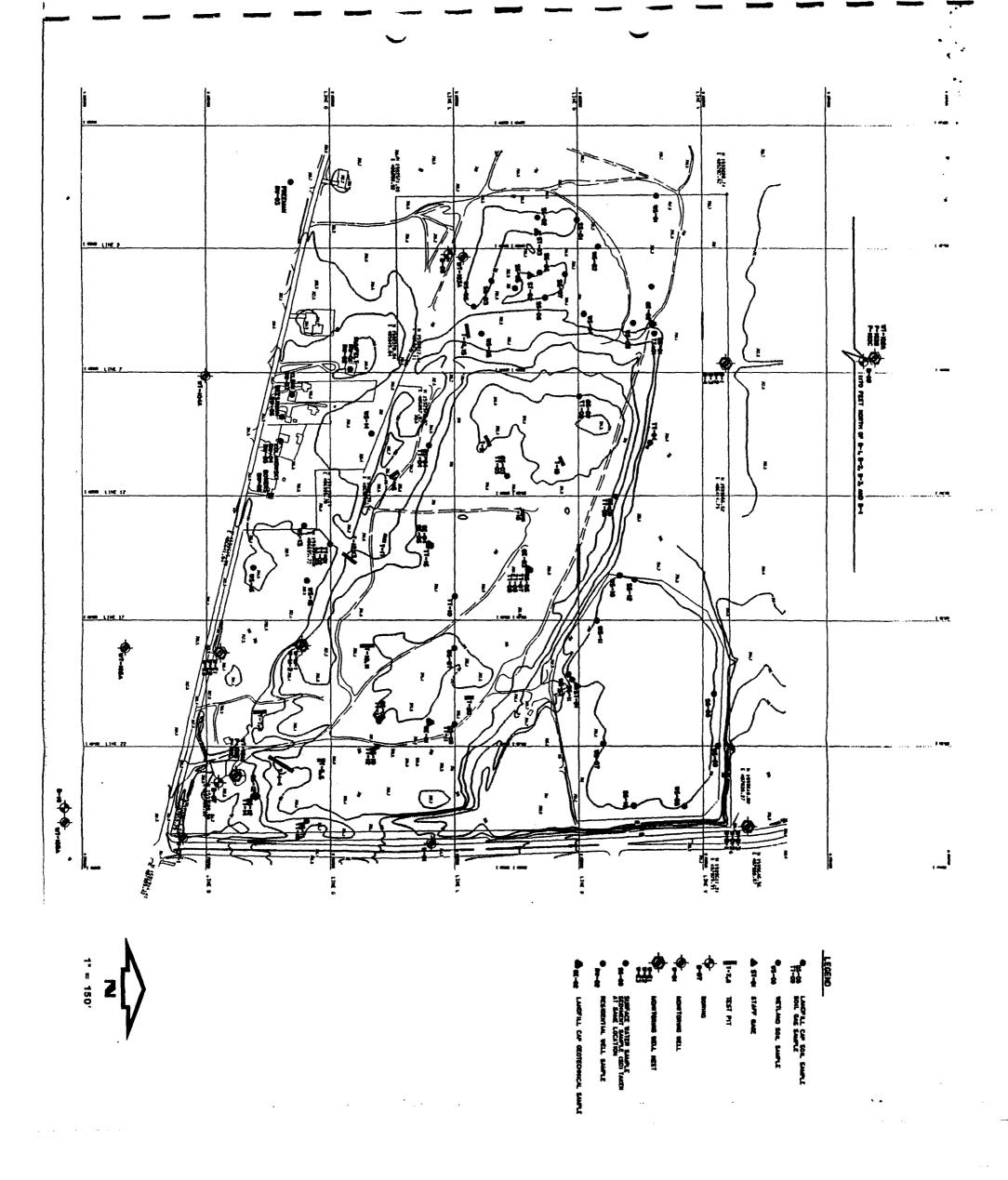
Three staff gauges were installed at the Himco Dump Site; one was installed in the gravel pit pond at the northeast area of the site, one was installed at the "L"-shaped fish pond at the southwest corner of the site, and one was installed at the smallest pond on-site located east of the "L"-shaped fish pond (Figure 1). The posts for anchoring the gauges were installed on October 24, 1990, by Eric Slusser and Tom Puchalski of Donohue & Associates, Inc. The gauges were installed onto the posts by Anya Kirykowicz and Steve Spiewak on December 14, 1990.

The staff gauges were installed in order to gather surface water elevation data. The measurements were taken on the same days as groundwater elevations from monitoring wells so that interconnection of groundwater and surface water can be evaluated.

Methods

The installation of staff gauges proceeded as described in Section 4.3 <u>Surface Water Hydraulic Monitoring</u> of the <u>Final Field Sampling Plan</u>, <u>Himco Dump RI/FS</u>, <u>Elkhart</u>, <u>IN</u>. The actual material used for the anchor posts for staff gauges deviated from what was described in the sampling plan. Two-inch I.D. electrical conduit in 8- or 10-foot lengths were used in place of the coupled galvanized steel described in the plan.

Anchor posts were driven into the bottom sediments of the ponds with a post driver. Hip waders were used to allow the installation in water approximately 2 feet deep about 3 to 5 feet from the shoreline. About 4 feet of the posts remained above water after driving inplace to allow the attachment of a sheet metal rule marked to 0.01-foot.



MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



The sheet metal rules were attached to the anchor posts by bolts which pass through the rule and into the posts. Holes were drilled in the posts to accommodate the bolts by using an electric drill at each staff gauge location. A gasoline powered electric generator was used to power the drill. The sheet metal rules were anchored with the top of the rule flush with the top of the anchor post. The elevations of the tops of the anchor posts were surveyed by Lang Feeney of South Bend, Indiana, on December 16, 1990.

Deviations

The locations deviate slightly from those shown in Figure 4-1 of the sampling plan. While the ponds shown in Figure 4-1 all have gauges installed, Figure 1 of this memorandum more accurately locates the actual staff gauge locations within each pond. The locations were modified to account for shoreline and bottom sediment conditions which were most favorable for the staff gauge installations. The conditions include consolidated bottom sediments, which provide a sturdy anchoring of the post, and the absence of shoreline brush which makes accessing and reading the gauges difficult.

Summary of Results

A table of the observed surface water levels and groundwater monitoring well water level elevations are included in Appendix A. Measurements of the level of ice during months when the surface water was frozen do not accurately reflect the free water surface elevation and should not be used to evaluate surface water to groundwater connection.

TP/ke

A/R/HIMCO/AA6

APPENDIX A WATER LEVEL MEASUREMENTS AND ELEVATIONS

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TECHNICAL MEMORANDUM - NO. 4



DATE: January 22, 1991

TO: Vanessa Harris, Site Manager

CC: Marcia Kuehl, RI Lead

Roman Gau, Project Manager

Mike Crosser, TSQAM

FROM: Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump RI/FS

GEOTECH BORINGS

<u>Introduction</u>

Four deep (175-foot) geotech borings were drilled and sampled as described in Exhibit A, Field Sampling Plan Addendum to Volume 2, Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana. Drilling activities for these borings began on December 17, 1990, and were completed January 9, 1991. These four borings were completed to investigate the site stratigraphy and to collect samples for geotechnical analysis at the Himco Dump Site, Elkhart, Indiana. The boring locations are provided in Figure 1 of this memorandum. Drilling and sampling activities were completed by Max Tinnin and Don Brewington of John Mathes and Associates, Inc. (Columbia, Illinois) with a TH60, Ingersol Rand air/mud rotary rig. Tom Puchalski of Donohue & Associates, Inc., inspected the drilling and sampling, completed time logs, logged all samples, collected select samples for geotechnical analysis, and performed air monitoring using a photoionization detector and gasponder.

Methods

Drilling and sampling were performed as described in Exhibit A, Field Sampling Plan Addendum to Volume 2, Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana, Section 4.2.

Each geotech boring began with using air rotary and a 7-7/8-inch tricone bit. The boring was blind-drilled to 18 feet. Eight-inch casing was then pounded down into the borehole to 8 or 9 feet. The 8-inch steel casing was then temporarily sealed in-place using granular bentonite. A 3-foot diameter steel casing was installed at the surface with a 6-inch diameter PVC tube extending to a 500-gallon mud tub. After the drilling mud was mixed in the tub, mud rotary drilling began. A 5-7/8-inch blade bit was used for the remainder of Borings 7, 8, and 9. Once this bit was worn out, a 7-7/8-inch blade bit replacement was used to drill Boring 10. Split-spoon sampling was accomplished with a 2-inch O.D., 2-foot long split-spoon sampler passed down through the inside of the drill stem. The split-spoon sampler was driven by a 140-pound down-hole hammer which was operated by a winch at the surface.

The Donohue geologist performed atmospheric monitoring at 5-foot intervals using a photoionization detector and gasponder. The geologist also logged all the samples using the Unified Soil Classification System (U.S.C.S.) based on visual inspection. A Munsell Color Chart was used to describe all soil colors.

The borings were drilled to the following depths: BRG-7, 174.5 feet; BRG-8, 166 feet; BRG-9, 173.5 feet; and BRG-10, 174 feet.

All borings were abandoned by backfilling with cement/bentonite grout emplaced by tremie pipe.

Deviations

The sampling plan specified using a 3-7/8-inch bit, however, either a 5-7/8 or 7-7/8-inch bit was used. The larger bits were required because split-spoon sampling was performed through the inside of the blade bit. Using a larger bit had no effect on the sampling of geotechnical borings.

Although several attempts were made to push shelby tubes, none were successful.

Boring 8 was finished at 166 feet instead of 175 feet because a till aquitard greater than 4 feet thick was encountered. In order to avoid passing through this aquitard at this downgradient location, the hole was stopped after two split-spoons sampled the unit.

Summary of Results

Boring logs, including atmospheric monitoring results, are provided in Appendix A.

Of the 20 geotechnical and 20 TOC samples sent to the laboratory, 15 geotechnical and 15 TOC samples were collected from the four deep geotech borings. Although three shelby tube samples were also designated to be collected from these four borings, attempts to retrieve these samples were unsuccessful.

Several complications caused delays in the drilling schedule. Some of the difficulties were weather-related. The operation of the drill rig was dependent upon the air system being free of water. Condensation would generally build up overnight which caused pressure losses in the air system. Isopropanol dripped into the lines would eventually clear up this problem. Mud or water freezing in the circulation hoses or in the mud pump also caused delays in the morning while a propane torch was used to thaw frozen parts.

One day of drilling was lost to an equipment failure. One of the main hydraulic hoses ruptured on the drill rig requiring replacement.

TP/ds

A/R/HIMCO/AA7

APPENDIX A
BORING LOGS

BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: Himco Dump PROJECT NO. 20026.023

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BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: HIMCO DUMP PROJECT NO. 20036.023

BRG-07

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BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: HIMCO DUMP PROJECT NO. 30036.033

BRG-C7

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BORING LOG

SOIL BORING NO.

Engineers & Architects
OFFITE ALGED GESTOVOWFING

SITE: HINCO DUMP PROJECT NO. 3000.093

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BORING LOG

SOIL BORING NO.

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Engineers	8	Arch	itects
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SITE: HIMICO DUMP PROJECT NO. 20036.033

BRG07

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, BORING LOG

SOIL BORING NO.

Engineers	& Architects
THPUTER ALDED	DESIGNORAFTING

SITE: HIMCO DUMP PROJECT NO. 20036,033

	_
BRG	07

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DRILLING METHOD: > 1/4 truent & GIC to 20 feet. 5/6 Hole bit & much

BORING LOG

WATER LEVEL READINGS

TIME

DATE

SOIL BORING NO.

GROUND SURFACE ELEV .: __

DEPTH CASING COORDINATES:__

Engineers & Architects	SITE: HIMCO DUMP PROJECT	NO. 30006.003
COMPLITER ALDED DESIGN/DRAFTING	i	

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BORING LOG

SOIL BORING NO.

Engineers & Architects

DRILLING METHOD. See page 1

SITE: HIMCO DUMP PROJECT NO. 20026.023

	DRILLING	METHO	o. See page I	WATER DATE	LEVEL I	READINGS DEPTH	CAS	ING			ND SURF	:		· :	
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BORING LOG

SOIL BORING NO.

BRG 08

r	Engineers & Architects	SITE: HIM	co Dum	P_ PROJ	ECT N	o. 200	036.033
1	URILLING METHOD, See Po)	WATER	LEYEL RE	ADINGS DEPTH	CASING	GROUND SU
	LOG BY: TEP						A. 25 . 62. 6

GROUND SURFACE ELEY .: COORDINATES: NORTH: EAST:

DATE START: 12/19/90 DATE COMPLETE:

DRILLER: Sae Da WEATHER: Snaw, 1894, West Wind Zmoh WELL INSTALLATION: HONE PHYSICAL SETTING: 500 PA SOIL DEPOSITIONAL USCS SAMPLING DATA AIR MONITORING SOIL DESCRIPTION AND 프 H DEPOSITIONAL B ENVIRONMENT DRILLING COMMENTS B N A R TYPE INTERVA SAMPLE PIO TIME WELL GRADED GRAVEL tip - green mafic whan 7'55 63-65 1342 0 shird TOCAS-01 63-68.5 OUTWASH .68 SP 12 TR 6/2LT brownish arey SAND, well sexteel ₹ 68-70 353 O fine grained, non plas, lawcoh, sont Tock8-02 68-68.5 CUTWASH ·72 10 YR 5/2 Grayish Brown SAND, well sorted 部 SP 55 75 73 75 1400 0 P.3 0 fingrained, non plas, low cok, est times conjuder interfer interest - soli play inclusion or chert() TOC 08-03 713-713,5 -76 78 As above SP 110 155 78-80 1410 0 outwash Todo8-011 -18-78.5 -80 82 41 755 83-85 1420 0 Phis SP Same as above TOC 08-05 38 . 8.5" zone of situating layers 10/18 50 Gayish Brn SILTY SAND, BOTE 5:11 800, 1 19/185 58-40 1434 0 thy you set of great field silly clay lange set 825 mathick 1/ GTOR-00 120-128 to

BORING LOG

WATER LEVEL READINGS

TIME

DATE

SOIL BORING NO.

GROUND SURFACE ELEV .: _

COORDINATES:_

Engineers & Architects
OFFUTER ALDER DESIGNOPHYTOG

DRILLING METHOD: See 75-

SITE: HIMCO DUMP PROJECT NO. 20086.083

DEPTH CASING

DBRG08

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BORING LOG

SOIL BORING NO.

Engineers	& Architects
COMPLIER ALDED	(FSIGN/IDAFTING

SITE: HINCO DUMP PROJECT NO. 20026.023

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BORING LOG SOIL BORING NO. SITE: HIMCO DUMP PROJECT NO. 20026-023 Engineers & Architects COMPUTER ALDED DESIGN/OFWFTING BRG OB URILLING METHOD: GROUND SURFACE ELEY .: _ WATER LEVEL READINGS DEPTH DATE TIME CASING COORDINATES: NORTH: EAST: LOG BY: . 12/19/98) DATE START: ORILLER: . DATE COMPLETE: WEATHER: See DO HAPO WELL INSTALLATION: NONE PHYSICAL SETTING: See DO ONE E SOIL
DEPOSITIONAL USCS SAMPLING DATA AIR MONITORING SOIL DESCRIPTION AND B N A R SAMPLE TIME DRILLING COMMENTS PID GR 155 153-155 1767 O OUTWASH Gray Bilty Clay layoral with the grusith an SH 10 YR 5/2 Groups in Brown SILTY SAND, Fine grained 2"55 158-160 720 0 50.0 CO 20% silt, maist OUTWASH 10 YR 5/2 Grayish Brown SILT, trace clay, 195 163-165/1740 0 PSO 0 moist trace 12" stranggul GEOTECH GTCB05 1740 163-164 12 3'SS 165-167 1749 0 2000 10 YR 4/2 Bote Gray in Brown SILT, trace day, 168 EOB 1/3/91 1740 Gom Puchable +7C Split Span to 166, drilled 74 bit to 1651 क्षेत्र देखे 472 173-175

BORING LOG

SOIL BORING NO.

Engineers & Architects

SITE: HIMCO DUMP PROJECT NO. 20076-023

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BORING LOG

DEPTH CASING

TIME

SOIL BORING NO.

GROUND SURFACE ELEY .: _

NORTH:

COORDINATES:

Engineers & Architects	SITE: HIMCO DUMP PF	ROJECT NO.	20026.023
DRILLING METHOD:	WATER LEVEL	READINGS	GROUND SU

DATE

BRG09

	OG BY: _				_		ם	ATE	START	EASI;	5/91		
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Donohue

BORING LOG

SOIL BORING NO.

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`	DRILLING	METHOD	see page 1	WATER DATE	LEVEL R	EADINGS DEPTH		SING	•		ND SURF	:		:	
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इस.			NS/1 Gray SAND, flowish, rat	ine arain	ul-close	tosilt			<u>兴</u>	7"55 K	385	610	0	1.3	2
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Donohue	. BORING LOG	;			S	OIL	BOR	ING N	١٥.
Engineers & Architects	SITE: HIMO DUMP PROJECT	NO. 6	300	26.0	772,	<u>.</u>		09	
URILLING METHOD	WATER LEVEL READING		NG			FACE : IORTH:	ELEV.		
DRILLER: WEATHER: OLEVNIST, 710F.	PHYSICAL SETTING:			DATE	START: COMPLI INSTAL	ETE: _			<u> </u>
SOIL	SOIL DESCRIPTION AND		SAI	UPLING	DATA		AIR M	ONITORII	4G
ENVIRONMENT	DRILLING COMMENTS	8 N	A		AMPLE INTERVAL	TIME	PID	O2/FE	
	1/2 and Gray SILTY GETAY, strati field								
2 /8"a	part, mast, low plas LACUSTRINE	11		 	<u> </u>	<u> </u>	<u> </u>		
	•	36		D'55	93-95	1644	0	71.30	0/0
Allone	ol Sheldy Tube 95-97			-					
	1745-No Recovery in Tube								<u> </u>
3	START 950 1/6/91								
CL CL	NO RECOVERY CLIM SPORT by SILTY CLAY LACUSTRINGE	35		2'55	98-100	953	0	21.3	c
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11/1/ CL 574/	Durk Cray SILTY CLAY, med pks,	12	水	744	103-105	icc 5	o é	01. 1 C	i /
Med c	ice, non streti fiell, wet								
	LACUSTRINE		+						
	2 Cline given SAND, 80% in grained,		/本·	1-1/				71	0
	medium gray silvanglidar, sait	. 1/3		195.	106-110	כוטו	<u>ن</u>	τ	1
(10 to 10 to	CUTWASH		4						
		+++	+						
17/2 CL 54 4/1	Park Gray SILTY CLAY, mereples,	+		724	113-115	1c23	9/	21.6	<u>درو</u>

med con, non-strate find, wet changes adar to 2,54 5/2 Grayish Birdon GLT clay

13.57 5/2 Crayish Bitwin SILT, trace for skill in Taminar, trace clay, well

CUTWISH

BORING LOG

SOIL BORING NO.

Engineers & Architects
CHAUTER ALDED DESIGNATING

SITE: HIMCO DUMP PROJECT NO. 20036.073

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٧	VEATH	ER:	See	Page	Fexa	<u> </u>	<u>-</u>	PHYSI	CAL	SETT	ING	<u> 500</u>	X	1						TE: _		6,19 VON	<u>=</u>
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54 5/2 Olive Grey SAND, noncen, now plas, fine grained, sat OUTWASH

ECB 1230 1/6/91 Split grace to 173.5, 5% blade Bit to 173.0 Jan Puchable

	Don	ohi	16		В	ORIN	G LOG					201 Г,	BORI	NG 1	١0.
(Engineers TOPPUTER ALDE			SITE: HIM	co DUMP	PR(DJECT 1	NO.	≥	XXX6	02:3		C BRO	<u> </u>	
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BORING LOG

SOIL BORING NO.

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BORING LOG

SOIL BORING NO

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BORING LOG

SOIL BORING NO.

(COPPUTER ALDE													<u>G10</u>	
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BORING LOG

SOIL BORING NO.

GROUND SURFACE ELEV .: _

Engineers & Architects
COMMITTEE ALLES DESIGNORMETING

DRILLING METHOD

SITE: HINCO DUMP PROJECT NO. 20086.023

WATER LEVEL READINGS

PRGIO

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	ORILLER: _				-				D	ATE	START:	מסל	7	1991	Τ—
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TECHNICAL MEMORANDUM NUMBER 5



DATE:

April 1, 1991

TO:

Marcia Kuehl

CC:

Bob Isenberg

FROM:

John Cicone

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.025

Himco Landfill RI/FS

GEOTECHNICAL DATA EVALUATION

Introduction

The objective of this data evaluation is to determine if the data provided from laboratory consolidation and triaxial shear tests, Atterberg limits, grain size and permeability is sufficient enough for use in Remedial Investigation (RI) and Feasibility Study (FS) reports for the Himco Landfill.

Analytical Results

The following table shows the tests for which data was provided and a summary of the results:

<u>LABORATORY TEST</u>	RESULTS
Unconsolidated Undrained (uu) Triaxial Shear	Cohesion (c) = 7 psi = 1008 psf friction angle (ϕ) = 33 degrees
Atterberg Limits	See Table 1 (attached)
Grain Size	30 curves total
Consolidation	Unable to obtain results with given data (see Geotechnical Data Interpretation)

Geotechnical Data Interpretation

Data provided for the unconsolidated undrained (uu) triaxial shear testing was sufficient to obtain cohesion and friction angle values. The attached figure shows the Mohr-Coulomb failure envelope plotted by the laboratory and the tangent line drawn by Donohue to obtain cohesion (c) and friction angle (ϕ) values. Test results indicate cohesion and friction angle for the test sample are approximately 7 psi and 33 degrees, respectively.

Data provided for grain size and Atterberg limits was complete and require no additional interpretation.,

Data was provided for a consolidation test. The consolidation coefficient, c_V , which is used to determine how long consolidation will take, can normally be determined from this test. However, c_V cannot be obtained with the data provided. All of the data curves seem to indicate the specimens had not reached 100% consolidation when the test was stopped. Two possible conclusions can be drawn from this termination. The first is that the test was stopped too early resulting in an incomplete curve and c_V cannot be calculated. The second is that the material may have undergone a very rapid consolidation and c_V could only be obtained with some difficulty and accuracy would be limited. The grain size curve for the consolidation test sample indicated a clayey silt, which does not normally have a rapid consolidation. Therefore, the second possibility seems less likely; however, definite conclusions cannot be made with available information.

Data was also provided for the consolidation test to allow for calculation of the compression index, C_c. This value is used to determine the magnitude of consolidation settlement. This value cannot be obtained because the x-axis is labeled improperly as ELAPSED TIME (min) when it should be labeled as a load or pressure (see attached figure).

Summary

The triaxial shear, Atterberg limit and grain size data were sufficient to obtain strength parameters, and to establish soil classifications of the on-site soil.

No permeability test data was provided with the laboratory results and should be obtained if drainage of material beyond site boundaries is a concern.

Consolidation test information was insufficient to calculate c_V and C_C . The laboratory should be contacted to determine why testing was stopped and to relabel the appropriate graph. Further, the laboratory should, as a matter of common practice, provide the c_V and C_C values.

Attachments - Atterberg Limits Results

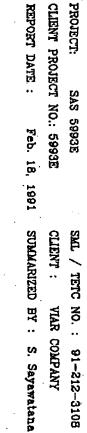
- Triaxial Shear Test Results

- Compression Index Curve

A/R/HIMCO/AH6

No constitution of

CONSOLIDATION TEST RESULTS (ASTM D2435)



SPECIFIC GRAVITY :

2.55 (assumed)

INITIAL VOID RATIO:

INITIAL DRY DENSITY: 91.0 pcf.

INITIAL MOISTURE CONTENT : 34.0 pot.

SAMPLE NO. :

HD K 14-01

DEPTH :

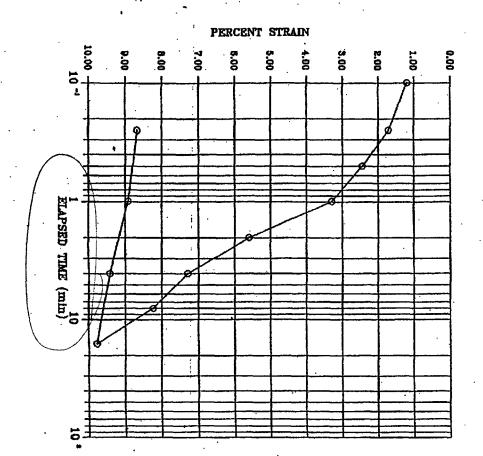


TABLE 1

SUMMARY

OF

LABORATORY TEST RESULTS

PROJECT:

SAS 5993E

TETC NO.: 91-220-3108

PROJECT NO.: SAS 5993E

CLIENT: VIAR COMPANY

REPORT DATE Feb. 19, 1991

SUMMARIZED BY: S. Sayawatana

LABORATORY MANAGER: (Arul) K. Arulmoli

	ATTERBERG LI	MITS (ASTM D 4318	3)
BORING .	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
SAMPLE NO.	(%)	(96)	(%)
HDGT-07-06-01	21	12	9
HDGT-07-07-01	17	13	4
HDGT-08-05-01	18	11	5 ·
HDGT-09-06-01	14	11	3 .
HDGT-09-07-01	23	_14	9
HDGT-10-04-01	21	13 -	8
HDGT-10-05-01	24	17	7

DEVIATORIC STRESS (PSI) 40.00 120.00 80.00 0.00 5.8 3 . 10.00 RXIAL STRAIN **東東市** 職 8 55 8 医医胃超 20.88 ここ 司 野 25.80 SHEAR STRESS (PSI) 80.00 120.00 0.00 40.00 . 8 £0.00 80.00 120.00 NORMAL STRESS (PSI) 160.00 8 8

240.00

PROJECT: SAS5993E PROJECT NUMBER: . 91ZD03

DATE: 02/91

. 91ZD03 The Earth Technology Corporation

TRIAXIAL TEST RESULTS
TEST TYPE: UU

TABLE 1

SUMMARY

OF

LABORATORY TEST RESULTS

PROJECT:

SAS 5993B

TBTC No.: 91-220-3108

PROJECT NO.: 8AS 5993E

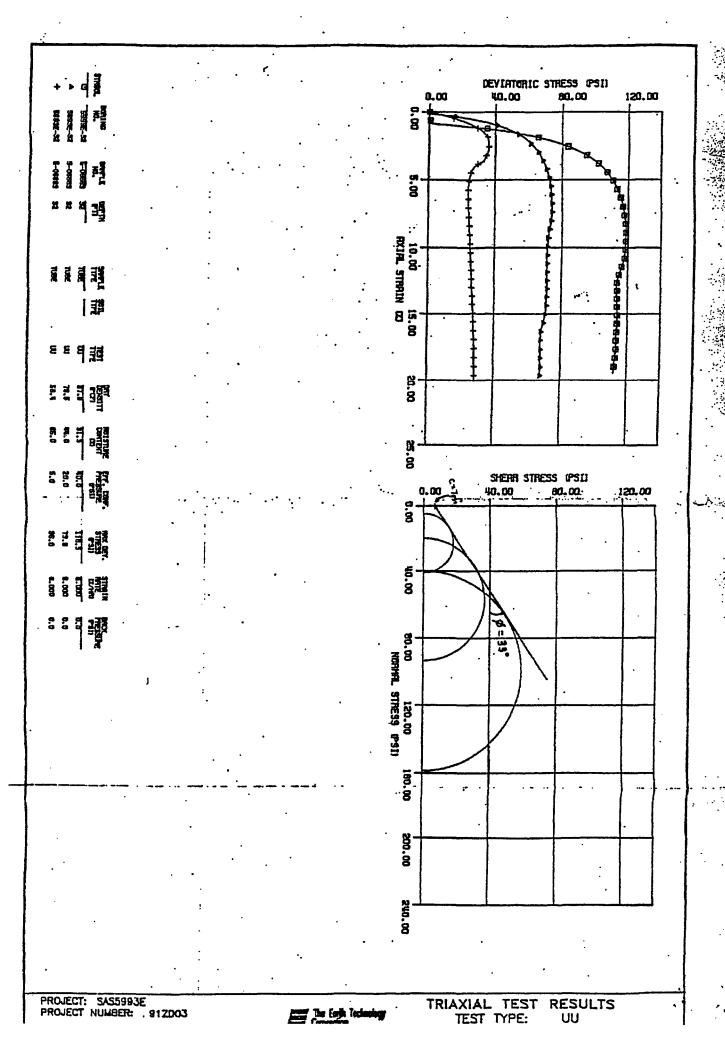
CLIENT: VIAR COMPANY

REPORT DATE Feb. 19, 1991

SUMMARIZED BY: S. Seyewatana

LABORATORY MANAGER: (Arul) K. Arulmoli

·	ATTERBERG LIN	NITS (ASTM D 431)	B)
BORING.	FIGUID FIMIT	PLASTIC LIMIT	PLASTICITY INDEX
Sample no.	(%)	(%)	. (46)
HDGT-07-06-01	21	12	. 9
HDGT-07-07-01	17	. 13	4
HDGT-05-05-01	16	11	5 ·
HDGT-09-06-01	. 14	11	3 .
HDGT-09-07-01	23 ·	_14	. 9
HDGT-10-04-01	21	13 ·	8
HDGT-10-05-01	24	17	7



APR 16 '91 14:13 DONOFILE FRIRFAX

CONSOLIDATION TEST RESULTS (ASTM D2435)

PROJECT:

SAS 5993E

SML / TETC NO. : 91-212-3108

CLIENT PROJECT NO.: 5993E

CLIENT: VIAR COMPANY

REPORT DATE:

Feb. 18, 1991 SUMMARIZED BY: S. Sayawatana

SAMPLE NO. :

HD K 14-01

DEPTH :

INITIAL DRY DENSITY: 91.0 pef.

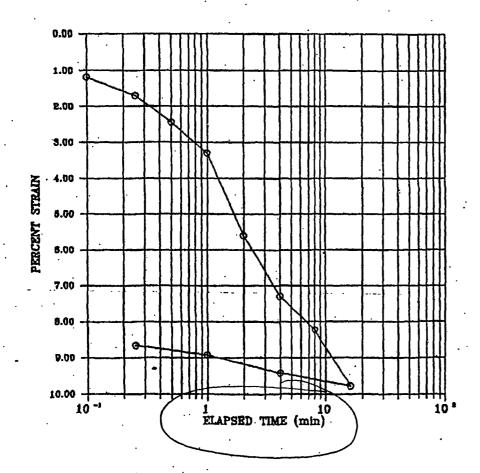
INITIAL MOISTURE CONTENT : 34.0 pot.

INITIAL VOID RATIO:

0.816

SPECIFIC GRAVITY :

2.55 (assumed)



TECHNICAL MEMORANDUM - NO. 6

DATE: APRIL 29, 1991

TO: Vanessa Harris - Site Manager

CC: Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TŠQAM

FROM: Tom Puchalski

SUBJECT: EPA Arcs Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump Phase I

PRIVATE WELL SAMPLING AND BASEMENT AIR SCREENING

Introduction

Groundwater samples were collected from five residential wells immediately south of the Himco Dump site along County Road 10, and one residential well immediately south of County Road 10 on October 22, 23, and 24, 1990. Four basements of these residences along County Road 10 were also screened for the presence of landfill gases.

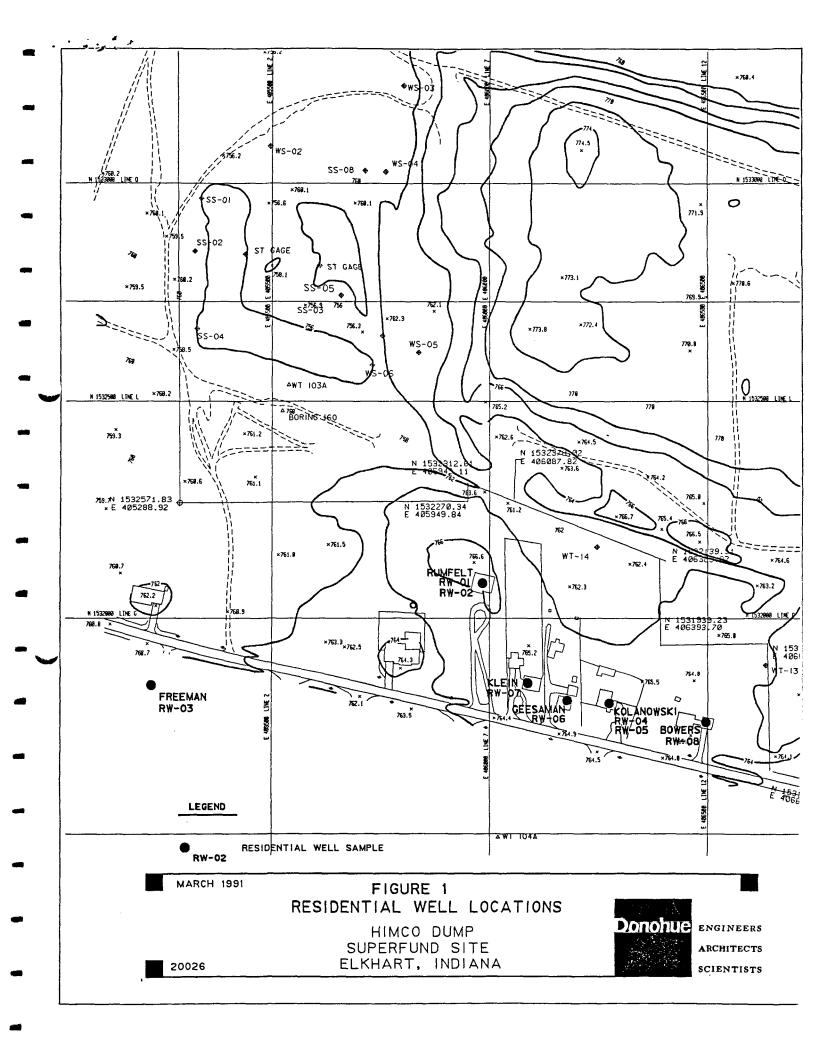
Residential wells were sampled to investigate groundwater quality. Originally, all residences had shallow (approximately 22 feet deep) wells. Deeper wells (RW-01, RW-03, RW-04, RW-06, RW-07, RW-08) (at 152 to 172 feet) were installed in 1974. Although the state found high levels of manganese in these wells in 1974 and were ordered replaced, some of the original shallow wells remain. Two wells (RW-02 and RW-05) were sampled at residences where an older shallow well was accessible in addition to their present deep wells. Shallow wells were sampled in addition to deep wells at the Rumfelt and Kolanowski residences.

Basement gas was screened to evaluate if landfill gas which may be generated at the site has migrated off-site and into these nearby resident's basements. This screening was qualitative to check for the presence of methane and hydrogen sulfide.

Procedures

Groundwater sampling of residential wells and basement air screening was carried out as described in Sections 4.2.4 and 4.8 of the <u>Final Field Sampling Plan</u>, <u>Himco Dump</u>, <u>Remedial Investigation/Feasibility Study</u>, <u>Elkhart</u>, <u>Indiana</u>. The residents names and their addresses are: Noble and Selma Bowers, 28279 CR 10; Mark Freeman, 28552 CR 10; Dave and Joan Geesaman, 28331 CR 10; James and Christine Klein, 28343 CR 10; Helen Kolanowski, 28213 CR 10; and Herman and Patricia Rumfelt, 28369 CR 10 (Figure 1). Samples obtained from newer deep wells were obtained directly from the tap at the kitchen





sink or if available, at a tap in the basement ahead of the water softener. The tap was allowed to purge for five minutes before the sample was collected. Samples taken from shallow wells were purged by bailing. A 1-inch bailer was used in these 1 1/2-inch I.D. wells.

Samples for bromide analysis were field filtered using a millipore filtration unit and 0.45 micron filters. Measurements of field pH, conductivity, temperature, and dissolved oxygen were obtained at the field trailer immediately following sample collection. Preservatives, sample bottles, and holding times are summarized in Table 4-2 of the Final Field Sampling Plan.

Deviations from Project Plans

One of the six residences which were originally scheduled for well sampling and basement air screening was removed from the list when the owner of the home could not be located. A homeowner located south of the Himco Dump immediately south of County Road 10 (Freeman) solicited EPA to be added to the list of residential wells to be sampled. Sampling of the Freeman well brought the total residential well locations back up to the anticipated six. The Kolanowski residence did not have a basement and, consequently, was not screened for landfill gas.

Not all of the original six old shallow wells were intact and accessible. In practice, only two older shallow wells (RW-02 and RW-05) were accessible for sampling.

The shallow residential wells were not of large enough diameter (1-1/2-inch) to sample with a Keck pump as described in the field sampling plan. A 1-inch bailer was used as an alternative sampling method.

Five gallons were removed from each of the two residential wells. Readings of pH, conductivity, dissolved oxygen, and volume removed were not recorded during purging of the residential wells, but were recorded after 5 minutes of running the tap for deep wells, or upon removal of 5 gallons from shallow wells.

The 1-inch bailer was decontaminated between sampling locations by an alconox and tap water wash, a tap water rinse, an isopropanol rinse, and two deionized or distilled water rinses. Isopropanol rinsates were collected in a 5-gallon bucket and covered for eventual discharge into an on-site frac tank.

Summary of Results

Eight groundwater samples were collected from six locations. Six deep wells were sampled from taps and two shallow wells were sampled by bailing.

The Geesaman and Bower shallow wells were abandoned; the shallow Klein well was in a location which made it inaccessible to bailing, and the fourth shallow well was at a residence which was locked and not occupied.

Basement air was screened at the Rumfelt, Geesaman, Klein, and Bowers residences. A hydrogen sulfide and methane gas detector was used to screen the basement air. No detections of these compounds were registered during any of the basement air monitoring.

A/R/HIMCO/AB2

ORGINAL

TECHNICAL MEMORANDUM NUMBER 7

DATE: January 24, 1991

TO: Vanessa Harris - Site Manager

CC: Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSQAM

FROM: Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump

LANDFILL CAP SOIL SAMPLING

Introduction

Twelve soil samples of the landfill cap at the Himco Dump site in Elkhart, Indiana, were collected for chemical analysis on November 8, 9, 10, 11, and 12. Sampling methods described in the <u>Final Field Sampling Plan</u>, <u>Himco Dump Remedial Investigation/Feasibility Study</u>, <u>Elkhart</u>, <u>Indiana</u> were followed. Sampling was done by Eric Slusser and Tom Puchalski of Donohue & Associates, Inc. The purpose of sampling the landfill cap was to characterize the chemistry of the white powder matrix which makes up the majority of the cap material.

Methods

Section 4.0 of the <u>Final Field Sampling Plan</u>, <u>Himco Dump Remedial Investigation/ Feasibility Study</u>, <u>Elkhart</u>, <u>Indiana</u>, describes the method used for soil cap sampling and the technique used to define the sampling locations. The sampling locations were spread out to cover the entire landfill cap. Soil samples were located from a systematic grid marked by survey stakes. The actual soil sampling locations are provided in Figure 1. Completed soils data forms are presented in Appendix A.

The twelve soil samples were collected from depths as shallow as three to nine inches and as deep as eight to sixteen inches. The depth varied dependent upon the thickness of the overlying sand and topsoil cover. The cover material overlying the white material, assumed to be calcium sulfate, was removed with a shovel prior to sampling at each location. A hand auger was used to dig out the white material. The sample was placed in a stainless steel bowl and immediately placed in two 4 oz. jars for volatile analysis. The remaining sample volume in the bowl was mixed using a stainless steel spoon. After a homogeneous mixture was obtained, the sample was divided into four quadrants. Small portions of each quadrant were used to fill each remaining sample jar.

Before sampling and between each sample location, all sampling equipment was decontaminated with: (1) a soap and tap water wash, (2) a tap water rinse, (3) an isopropanol rinse, and (4) two rinses with distilled or deionized water. Isopropanol rinses were retained in a covered 5-gallon pail for eventual discharge into the on-site frac tank.

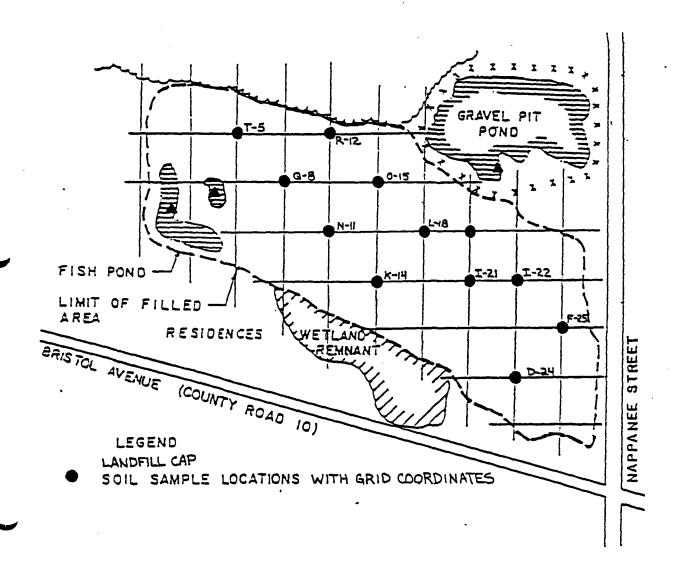
Deviations

Figure 4-1 of the Field Sampling Plan shows soil sampling locations based on a grid system which was not used in the field. The grid shown in Figure 4-1 is diagramatic and not meant to represent the final surveyed grid. It was designed to show approximate soil cap sampling locations. Actual grid points were selected in the field using the general pattern, as shown in Figure 4-1, so that the entire area of the landfill cap was sampled. The actual grid points are shown in Figure 1 of this memorandum. Photographs were not taken of each location on the landfill cap as the sampling areas were similar, and the photo would not aid in identifying the location.

Summary of Results

Soil samples of the cap soil material were taken at twelve locations spaced out across the area of the landfill cap. In general, the white material thins from west to east. The appearance of the white material is uniform with no discernible trends. Soils data forms are provided in Appendix A of this memorandum.

A/R/HIMCO/AB1



0 500 1000 - SCALE: FEET

SCALE IS APPROXIMATE

SOURCE: US EPA, AUGUST, 1986

Donohue APPROXIMATE SITE SAMPLING LOCATIONS

20026 May, 1990 FIELD SAMPLING PLAN HIMCO DUMP SITE ELKHART, INDIANA

FIGURE

1

Donohue	Soils Data Form	Soil Sample Area Caps Soil Subsample
Engineers & Architect	s & Scientists Site Himo]	Dum) Project No. 200
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SAMPLE DEPTH .	12-18" from surface	
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•		
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at northwest cor	PTION OF SUBSAMPLING LO	cation: T-5 survey
at northwest con	SUBSAMPLE: Lubite silt (MC	han plas, low rely, damp
at northwest con	ner of land fill cup at adge	a f wands
at northwest con	ner of land fill cup at adge	a f wands
DESCRIPTION OF S	ner of land fill cup at adge	I non plas, Incircle, damp
DESCRIPTION OF S	SUBSAMPLE: White silt (MC	I non plas, Incircle, damp

•

DATE 11890 TIME 1641 COLLECTOR TON WICHALSKI ERIC SLUSSER PHYSICAL DESCRIPTION OF SUBSAMPLING LOG 4 350 feet past of western edge of land	
TIME	CATTON. A.S.
PHYSICAL DESCRIPTION OF SUBSAMPLING LO	CATTON. A.S.
PHYSICAL DESCRIPTION OF SUBSAMPLING LOG 4 350 feet east of western edge of land	CATTON, A.S.
	CATION: Q-0 survey ST
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ANY OTHER CHARACTERISTICS OF NOTE: Bottomax 18".	on of white silt cap of

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Engineers & Architects & Scientists Site Himm Dumb Project No DATE 11/9/90 TIME 849 COLLECTOR TOH PUCHALSKI ERIC SLUSSER SAMPLE DEPTH 6-18" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Car sail stake N-11 near middle of flat covered law fill, vegetation surface consists of mass and grass. DESCRIPTION OF SUBSAMPLE: Sample consists of white silt with a trace of fine bown sawd in thin (2 a few num) strip	onohue	Soils Data For		il Sample Area (23) il Subsample65
COLLECTOR TOH PUCHALSKI ERIC SLUSSER SAMPLE DEPTH 6-18" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Cap sail stake N-11 near middle of flat covered law fill, vegetation surface comsists of mass and grass.	gineers & Architects	& Scientists Site	Himm Dumh	_ Project No. 200
PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Carsoil stake N-11 near middle of flat reveral law fill, vegetation surface consists of mass and grass.	ME <u>848</u> OLLECTOR IDA			
surface romsists of moss and grass.	MPLE DEPTH -	6-18"		·
DESCRIPTION OF SUBSAMPLE: Sample consists of white silt with a trave of fine brown sand in thin (2 a few num) striv				N: Capsoil at s vegetation at gr
	SCRIPTION OF S	UBSAMPLE: Samb fine brown sand in	le consists of thin 12 a few	white silt (ML)
ANY OTHER CHARACTERISTICS OF NOTE:	Y OTHER CHARA	CTERISTICS OF NO	OTE:	

Donohue	Soils Data Form	Soil Sample Area (Soil Subsample (
Engineers & Archit	ects & Scientists Site Hima	Project No. 20
DATE 1199 TIME 937 COLLECTOR	TON PUCHALSKI	
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	FSUBSAMPLE: White silt	- (the) with a trace of
DESCRIPTION OI		
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Donohue	Soils Data Form	Soil Sample Area <u>ion</u> Soil Subsample <u>65</u>
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Engineers & Architect	s & Scientists Site Lime	Project No. 30
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TIME	<u> </u>	1
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	11	
SAMPLE DEPTH .	8-16"	
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PHYSICAL DESCRI lain Of III Coup ≈ 10	0 feet porth of words	OCATION: Middle north of the survey stake R-12
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land fill cop ≈ 10	0 feet porth of words	it survey stake R-ia
land fill cop ≈ 10	O feet porth of wards of south del inlales.	it survey stake R-ia
land fill cop ≈ 10	O feet porth of wards of south del inlales.	it survey stake R-ia
land fill cop ≈ 10	O feet porth of wards of south del inlales.	it survey stake R-ia
DESCRIPTION OF S	SUBSAMPLE: White silt	(ML) Nowch non plas, do
DESCRIPTION OF S	SUBSAMPLE: White silt	(ML) Nowch non plas, do
DESCRIPTION OF S	SUBSAMPLE: White silt	(ML) Nowch non plas, do
DESCRIPTION OF S	SUBSAMPLE: White silt	it survey stake R-ia
DESCRIPTION OF S	SUBSAMPLE: White silt	(ML) Nowch non plas, do

Donohue	Soils Data Form	Soil Sample Area Lands
Engineers & Architect	s & Scientists Site Himan	Dirmo Project No. 300
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COLLECTOR	DM PUCHALSKI ERIC SLUSSER	
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	4.11:40 2:11 (
which was not	SUBSAMPLE: White silt (1) I consists of brown fine sampled. Grey silty san	
6" of cover fil	I consists at brown tim	re arrained silty sawle
which was not complete.	sampled. Grey silty sai	re arrained silty sawle
which was not complete.	I consists at brown tim	re arrained silty sawle

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Donohue	Soils Data Form	Soil Sample Area Land Soil SubsampleGS(
Engineers & Architec	ets & Scientists Site Himo	o Dumb Project No. 200
DATE	0	
TIME 913	<u> </u>	•
	RIC SLUSSER OM PUCHALSKI	
SAMPLE DEPTH	17-15"	
SAM LL DEI III		
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DESCRIPTION OF	You feet could not the i	sts of white silt/ML how c
DESCRIPTION OF	SUBSAMPLE: Sande consi	sts of white silt/ML how c
DESCRIPTION OF	SUBSAMPLE: Sample considerith brown fractures - re	sts of white silt/ML) how care.
DESCRIPTION OF MON plas, indist	SUBSAMPLE: Sample considerith brown fractures - re	sts of white silt/ML how c

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Donohue	Soils Data Form	Soil Sample Area <u>Law</u> Soil Subsample <u>එර එ</u>
Engineers & Architec	ts & Scientists Site Himmo	Dump Project No. 200
DATE	0	
TIME 950	<u> </u>	
	h Puchalski Ric Slusser	•
SAMPLE DEPTH	13"-1.5"	
access rock at each	tedge of landfill cap at	survey marker L-21. Abo
access rock at each	tedge of landfill cap at	survey marker L-21. Abo
DESCRIPTION OF S	SUBSAMPLE: Lighte areas a	and light are: Great of sil
DESCRIPTION OF S	SUBSAMPLE: Little areas a ce. Trace light reflow trac	and light greif great of sil
DESCRIPTION OF S with mother tra 0-6" - Brown 6-13" Blow	SUBSAMPLE: White areas a ce. Frace light inflow fraction fram silty sand	and light grang arous of ail
DESCRIPTION OF S With Modeletration 13-15" Wh	SUBSAMPLE: Little areas a ce. Trace light reflow trac	and light grang arous of ail
DESCRIPTION OF S With mortletr-tra 0-6" - Bro 6-13" Blad 13-15" What 15" Gr	SUBSAMPLE: White areas a ce. Frace light inflow frace cin fram silty sand ck civilery fill ite & gray silt — Sam ey fixe sand	and light grang areas at all tures
DESCRIPTION OF S With mortletr-tra 0-6" - Bro 6-13" Blad 13-15" What 15" Gr	SUBSAMPLE: White areas a ce. Frace light pellow frace on fram silty sand ck civilery fill ite & gray silt - Sam	and light grang areas at all tures
DESCRIPTION OF S With Monthetr-tra 10-6" - Brown 13-15" What Is Is Is Is Is Is Is Is Is Is Is Is Is	SUBSAMPLE: White areas a ce. Frace light inflow frace cin fram silty sand ck civilery fill ite & gray silt — Sam ey fixe sand	and light grang areas at all tures

Donohue	Soils Data Form	Soil Sample Area Lo Soil Subsample
Engineers & Architect	s & Scientists Site <u>Himea</u>	Dung Project No. 20
DATE	127	•
	PHYLYHUSKI Riy slussfr	•
SAMPLE DEPTH .	8-18"	
-		
Hat land fill cas	PTION OF SUBSAMPLING I	OCATION: East edge of
Į.		
DESCRIPTION OF S	UBSAMPLE: White 5.1+(1)	12) law on honder hor
DESCRIPTION OF S	UBSAMPLE: White silt () that iros. 3" of brown	1L) law sol, would him fright stricours - not
DESCRIPTION OF S	UBSAMPLE: White silt () that rown	1L) law on hondes hon fright stronger-not
	UBSAMPLE: White 5.1+() Factors. 3" of brown ACTERISTICS OF NOTE: L	

••

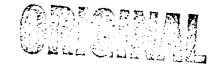
Donohue	Soils Data Form	Soil Sample Area <u>I</u> Soil Subsample <u>G</u>
Engineers & Architect	ts & Scientists Site Him	res Durid Project No. 2
DATE)	
TIME 853		
	om Puchalski Ric Slusser	
SAMPLE DEPTH	2-9"	
SAMPLE DEPTH	3-1	
T-22 at east ed	prion of subsampling ge of access road. Piles	of asphalt debris nears;
DESCRIPTION OF S fine gratived silty	SUBSAMPLE: White silt sand (SH). Sample has ca	(ML) interlayer of with brown acrid HzS oder.
ANY OTHER CHAR	ACTERISTICS OF NOTE:	(ML) interlayor of with brown acrid HzS odor. Base of silt defined by
	ACTERISTICS OF NOTE:	

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Donohue	Soils Data Form	Soil Sample Area Lawl.
Engineers & Architect	s & Scientists Site Himco D	Project No. 2003
DATE 11/12/40	·	
COLLECTOR I	TH PUCHALSKI RIC SLUSSER	•
SAMPLE DEPTH	0-4" - Cover soil - Not Sampled	
	4"-18" - Scimpled .	
PHYSICAL DESCR	IPTION OF SUBSAMPLING LO	CATION: 60 feet west
Nappained Stext	T 7G	
Adjustance in ex	ENSION IT FIRST	
napitalies // ec	ENSION III Fran	
NO SIGNIES II CO	THSION IN FIRST	
DESCRIPTION OF S	SUBSAMPLE: White silt w	ith a trace of rootlets
DESCRIPTION OF S		ith a trace of rootlets
DESCRIPTION OF S	SUBSAMPLE: White silt w	ith a trace of rootlets
DESCRIPTION OF S	SUBSAMPLE: White silt w low con, non plas.	
DESCRIPTION OF S	SUBSAMPLE: White silt w	

D-34 Anct of access road \$ 100 feet NE of job trailer ' DESCRIPTION OF SUBSAMPLE: White salt (TIL) 15:4/2 light brown Ells staining & rootlets.	Donohue	Soils Data Form	Soil Sample Area Los Soil Subsample 45
TIME 1030 COLLECTOR ERIC SLUSSER TOM PUCHALSKI SAMPLE DEPTH 4-8" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Survey stakes	Engineers & Architects	& Scientists Site Himco T	Jund Project No. 20
COLLECTOR ERIC SLUSSER TOM PICHAUSKI SAMPLE DEPTH 4-8" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Survey stake D-24 Aust of access road \$ 100 feet NE of job trailer DESCRIPTION OF SUBSAMPLE: White sult (Til) (2:4) light brown CLLS staining & rootlets.	DATE ula 90		
PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Survey stakes D-24 enst of access road \$ 100 feet NE of job trailer DESCRIPTION OF SUBSAMPLE: White silt (TIL) with light brown Cits staining & pootlets.	COLLECTOR ER		•
D-34 Anct of access road \$ 100 feet NE of job trailer ' DESCRIPTION OF SUBSAMPLE: White salt (TIL) 15:4/2 light brown Ells staining & rootlets.	SAMPLE DEPTH _	4-8"	
D-34 Auct of access road \$ 100 feet NE of job trailer ' DESCRIPTION OF SUBSAMPLE: White silt (TIL) 15:4/2 light brown filts staining & pootlets.			
fits staining & rootlets.	PHYSICAL DESCRIP D-24 Auct of acc	TION OF SUBSAMPLING LO	CATION: Survey stake of jub trailer
INY OTHER CHARACTERISTICS OF NOTE: Could not Gruple at a	PHYSICAL DESCRIP D-24 Auct of acc	TION OF SUBSAMPLING LO	CATION: Survey stake of jub trailer
M A COMPE SITE OF SITE	D-24 Auct of acc	JBSAMPLE: White SILL / TIL	nf jnlo trailer
	D-24 each of acco	JBSAMPLE: White SILL / MC	of job trailer

TECHNICAL MEMORANDUM NUMBER 8



DATE:

April 3, 1991

TO:

Vanessa Harris - Site Manager

CC:

Roman Gau - Project Manager

Mike Crosser - TSOAM

FROM:

Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump RI/FS

WELL SAMPLING

Introduction

Ten groundwater monitoring wells installed during this investigation, and 23 previously installed wells were sampled at the Himco Dump site on November 14 through January 9, 1991, to investigate the vertical and horizontal extent and degree of contamination of the uppermost unconsolidated aquifer. Groundwater samples were collected by Eric Slusser, Steve Spiewak, Tracy Koach, and Anya Kirykowicz of Donohue & Associates, Inc. Groundwater samples were collected as described in Section 4.2.4 of the Final Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana. The well locations are shown in Figure 1. Completed purge and sample collection forms are in Appendix A. Table 1 contains the well bottom depths for all wells used in the sampling event.

Methods

All field meters were calibrated at the beginning of each day before sampling activities began. The sampling equipment was transported to each well location in plastic coolers.

After unlocking the protective casing, a photoionization detector was used to monitor the air near the casing top. A decontaminated water level measuring tape was then lowered into the well casings to obtain a water level and well bottom depth. This information was recorded on the purge and sample form. A well volume was calculated from this information so that at least five volumes could be removed during the purging process.

A YSI water quality meter was connected in-line with a Keck pump so that direct measurements of pH, conductivity, and temperature could be collected from the purge water. Purging continued until the readings have stabilized to pH ± 0.1 unit, conductivity ± 10 percent, and temperature to $\pm 0.5^{\circ}$ C. This information was recorded on the purge and sample collection form. As soon as the purge pump was removed, a second reading of the water level was obtained.

An alternative purging method was used for 4-inch diameter wells due to the large volumes of purge water which needed to be removed before sampling. A stainless steel submersible pump was used which pumped up to 20 gallons per minute. This 220-volt electric pump received its power from a portable gasoline generator.

A 500-gallon polyethylene tank was strapped to the back of a four-wheel drive pickup truck so that the purge water could be collected from each well and transported to the on-site 21,000-gallon frac tank. Measurements of pH, conductivity, and temperature were recorded periodically during the purging process with a combination pH, conductivity, temperature meter. The Keck pump was used to sample these wells following purging with the submersible pump.

Wells F-1 and F-3 were purged by bailing with a 1-inch diameter bailer. Readings of pH, conductivity, and temperature were collected periodically as purging progressed.

The time between the completion of purging and the collection of the sample did not exceed 24 hours for any well. Table 4-2 of the Final Field Sampling Plan summarizes the sample container and preservative requirements. When a preservative was added to a sample, pH paper was used to ensure that adequate preservative was added.

Samples obtained for dissolved metals or bromide analysis were collected in a one liter polyethylene container for filtration at the field trailer. Samples were filtered with 0.45 micron paper using a millipore filtration unit in combination with nitrogen supplied by a pressurized tank.

All samples were stored in coolers with ice until custody was relinquished to the sample custodian at the field trailer.

Outer parts of the Keck pump and the one-inch bailer, which came into contact with groundwater and were used for sample collection, were cleaned between wells with an Alconox and tap water wash, a tap water rinse, an isopropanol rinse, and two deionized water rinses. The inner parts of the Keck pump and the submersible purge pump were cleaned by pumping distilled water through the system, or in the case of the purge pump, by rinsing the inside and outside several times with distilled water.

Deviations

Wells F-1 and F-3 were purged and sampled with a bailer instead of a Keck pump as described in the sampling plan. A Keck pump was too large to fit in these wells. Using a bailer did not effect the sample integrity.

A 3-inch submersible pump was used to purge the 4-inch diameter wells because a more rapid purging method than a Keck pump was needed to remove the large volume of groundwater from these wells. The purging was followed with sampling accomplished with a Keck pump.

Summary of Results

Twenty-three wells installed in 1977 and 1979 by the U.S.G.S. and ten wells installed by Donohue for this investigation were sampled for groundwater. Large volumes of purge water were required to be removed to purge the required five-well volumes because of the 4-inch diameter and extreme depth (up to 495 feet) of some of the U.S.G.S. wells.

TP/ke

A/R/HIMCO/AG7

WELL DESIGNATION

DEPTH TO SCREEN BOTTOM (in ft.)

B-1 B-2	495 12
B-3	129
B-4	173
CP-1 E-2	20 17
E-3	174
F-1	32
F-2	153
F-3	15
G-1 G-3	50 169
I-1	172
I-2	15
I-3	35
J-1	40
J-2 J-3	18 152
M-1	24
M-2	103
N-1	30
O-1	20
Q-1 WT-101A*	20 18.75
WT-101A* WT-102A*	18.50
WT-103A*	18.50
WT-104A*	18.80
WT-105A*	18.50
WT-106A*	21.25 100.50
P-101B* P-101C*	167.50
P-102B*	67.90
P-102C*	162.00

* Wells installed by Donohue during this investigation. All others were installed by the U.S.G.S. in 1977 and 1979.

A/R/HIMCO/AG7

APPENDIX A WELL PURGE AND SAMPLE COLLECTION FORMS

Donohue Engineers & Architects

Well Purging and Sample Collection

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Equipment_	· · · · · · · · · · · · · · · · · · ·	Airlift		N2 Lift_		In. Baile	r	Length_	F	t. Material
Pump KECK	Manufa	cturer		Dia	meter	Descript	tion of site temp.,soil,	conditio	ns)	
Well No.	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Comments
1555	8.94	29.29	.3.32							
160.5	<u> </u>					7735	.143	11.8	У	SLIGHT CON
16.10				35		263	296	12.5	4	SLIGHT (CF.) SLIGHT (GF.)
				7.0		77.63	.300	13.6	4	1077 5116/
16.15	}			10.5		262	.50.2	12.7	1	
16.18				14.0		7.61	.3.45	/3.7	٨	
1620				17.5		7.60	.329	12.7	1	
1633	-16:	12.1016								
1185	FIV	154								DISEXVID O
										= 4.2
					-		1			
							 			
								1		
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								+		
							<u> </u>	1		
711 WEI							<u></u>			
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Well Purging and Sample Collection

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-	ump_se						(weather,	temp.,soil, co	onditio	ns)	
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	250 ET - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	9.16	28.5	2,34	0		18	0.523	1.2.0	Slibly	
	1538				3.5	 		0.527			
	1540				7.0			0.5.24			
	1542				10.5		8.36	D.529	12.6	CLEAR	
	1-1544				14.0		14.73	6.515	12.6	CLEAR	PH, WENT
Ŀ	154E				17.5		9-17	0.514		CIGAS	
	1548				21.0		8.36	0.512	12.t	CLEAR	
. J	1550				24.5		8.11	0.511	12.E	CLEAR	
	1552				28.0		8.00	0.540			
	1554				31.5			0.507			
4	1559				35.0	4.7	7.90	0.50b	17.6	CLEAR	
					38.5	AK/3/40					
<u> </u>	Tuo					AV. 12/9/					SAMP/11
1	16.20					TQ 9.15					
}							·				DISOLVED
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ŀ											<u> </u>
+											
-											
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N	otes O- (74.5	<u>-4.16 =</u>	20.34	20.34	<u>x 0,163</u>	= 3,33	3.32	r 5=	16.6	· · · · · · · · · · · · · · · · · · ·
							-	/ 			·

Well Purging and Sample Collection

		Airlift		N2 Lift_		In. Baile				t. Material
imp Keck	Manufa	cturer		Dia	meter	Descrip (weather,	tion of site temp.,soil,	اغزیراندار ondition	AL STICET, 18) M. SYMAY	VOT TO HYDIRAT 15
Vell No.	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pН	Cond.	Temp	Turbidity Y/N	Comments
C-/				ؿ		269	./36	15.4		135 ⁷
1340	497	.33.69	3 05	3.1		7.61	. 454	122	4 2001	CRECHISH PINT
1355				6.2		7.61	.570	12.9	Y 5214H	LT GREEN SH SI
1400				9.3		7.57	900	13.0	Y 52,61.	- "
14.3				124	···	7.51	.561	13.0	4 5:1614	PORT ET GPN -11
1.0,000				155		7245	.553	13.9	4 3214,89	- 11
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1410		12 1NO	į.				ļ	-		;
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W/10/5

Depth to Water Depth to Water Bottom Solution	ethod of Pu	rging Pun	nped	Baile	d						
									ength_	F	t. Material
Time Water Bottom Calculated Removed (gal.) Time Water Bottom Calculated Removed (gal.) After pH Cond. Temp My/N Comments Fig. 1.36 18.72 21 1 7 45 950 11.1 7 45 11.5 7 45	mp_ <u>КСТК</u>	Manufad	cturer		Dia	meter	Descript (weather,	ion of site. temp.,soil, c	で名のい onditio	ביע <i>ג פוריין</i> (ns)	KIMILA YELL
15 745 , 985 11.1 21 1 745 , 985 11.1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Calculated	Removed		рН	Cond.	Temp	Turbidity Y/N	Comments
15 745 956 117 545 = Juell vol. 15 744 fr.		:136	10 77	121	1		705	965	111		iliey Mentry
			_/3./-							SIMIL	Caling - yellin.
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PM./86

Well Purging and Sample Collection

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14.54				3.0		748	1.054	12./	W	
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14.51				Lo		796	1. E.S-L	12.3	u	
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1837	50	FLING					<u> </u>			
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Donohue

Project No.			_				2			
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ump <u>KC</u>	<u>≮</u> Manufa	cturer		Dia	meter	Descript (weather,	ion of site. temp.,soil, c	onditio	ns)	
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11.56				16 0		8.05	, 537	15.5		
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Well Purging and Sample Collection

WT101/f

Engineers & Architects

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Pump KECK	Manufa	cturer	<u>-</u>	Di	ameter	Descript (weather,	ion of site. temp.,soil, c	GE AS O	BK(TZY	MD 40.2
				(Total)						
Well No.	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Comments
WT 164A										
3.20	11.75	18.90	1.7.1	Ċ		7.77	0.084	101	sindly	
0721			.,	Z		7.47	0.093	10.8		
:123				3.5		8.25	0 097	il.c		
1924				5		9.34	x 098	11.1		
3471				76.5		9.44	0.100	11.2		
				ØĜ		5.41	0 101	11.3		
				9.5		8.53	0.102	11.3	1	<u> </u>
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Well Purging and Sample Collection

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mp_ <u>KEUK</u>	Manufac	cturer		Dia	meter	Descript (weather,	tion of site. temp.,soil, c	ondition	ua) \ [714 <u>2</u> 73.37	13 LIR WILL FT C.
Fime	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Comments
بالرسوس	9.72	18.52	1.43			4.07	.306	11.2		X 52 32161
				i. 5-		8.14	3.04	11.2	У	1,
				3 c		\$16	299	12.1	4	WARY SLICKE
	· ·			4.5		37.15	397	13.2	_ \	
2.27				6.0		6,14	397	12.2	~/	
				7.5		8,13	296	13.2	d	
7,6	5461	بربحرتر سو	دار شر							
125	FIN									
										D.o. = 5.25
	·									7,0, 5.39
									-	
						<u> </u>				
										
										
es2''	we II	0.16		.3> ≃		0				18.52-9.72 cs 80
	,	<u> </u>	3 * Y	¥0 -	1. 43	5-1	I well	601		
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Well Purging and Sample Collection

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Engineers & Architects

IT ISEC.	Time	Depth to Water	Depth to	l Values							63 , 30
OT 10kg	Time		Denth to	Making					14°C		
10-10-10		119161	Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рΗ	Cond.	Temp	Turbidity Y/N	Commen
	34	746	18 47	1.5	1.0		7.15	684	W 3	~	0-2.2
	:31		,		30		718	710	6.0	N	0, 2.1
<u></u>	43				4.5		7.13	711	592	N	00-2.7
10	47				6.0		708	728	590	N	00 = 2.2
	51				7.5	9.46	7.68	733	540	<i>1</i> 3.	0: =2.2
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Well Purging and Sample Collection

	5-13 mp	人.	Clorer				(weather,	temp.,soil, co	ondition	ns)	wing , wind N
	Well No. Time	Depth to Water	Depth to Bottom	Volume Calculated (gai.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Lomments LES UFIN
	P-1018 X:52	9.30	100.70	14 90	15		970			7	+ Stightly forder
ηl	9:02				30		9.28	,887	11.9	Y	Slightly turbed
	9.13				45		840	,846	11.8	4	aligntly throad
	9.23				Co		8.63	1828	11.8	Y	Singath, to but superglar Committee
	7.31				15		8.52		11.70	y	milky
	7 64				40		8.44	. 776	115	7	IV SILLAHO FACELLE
	10 21				105		8.48	. 159			Milky V Stratty turker Milky
		Wat	er S	ampled	12	09					
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Well Purging and Sample Collection

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Method of Pu		Airlift		NO LIFE		In Raile		enath_	F	t. Material
ump	Manufac	turer_k	cck.	Di	iameter <u>l. 7</u>	Descript (weather,	ion of site. temp.,soil, co	col d	1 c 15.	in Scottered
Well No. Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Comments
P-1015	4.40	163 2	25.04	25		8.07	.436	120	Y	51,541, tarbid
15:14				50		798		11.9	Y	r rungia
15 22				15		7.94	424	11.8	Y	L+ Gay - Bauna turkid - Stynd
15 49				100		7.92	.422	ii8	Y	V Stophedy throad
16.63				126		7.91	,422			
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	W	iter .	Sample	16:	11	-				
		116.	J Ct TA IS	16.	77					
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										<u> </u>
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otes2"										.45 = 15 3 .6
* Very	mudd	y 60+1	ton , h	va to	+ !</td <td><u> </u></td> <td>TAVE IV</td> <td>20-</td> <td>3' 06</td> <td>Sediment</td>	<u> </u>	TAVE IV	20-	3' 06	Sediment
Cond.	activity	<u></u>	dias	0, 2	Scal	_ أ_	m75/	cm		
	·						<u> </u>			

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Well Purging and Sample Collection

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quipment											
ump <u>X</u>	Manuta	cturer	RECA	U	ameter <u>//_/</u>	(weather,	temp.,soil, c	onditio	ns)	*****	
/ell No. Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Commer	
16 61	7.10	18.60	187	2		744	,353	7.3	Y	L+ 4/-	v Slyntla factin
16.62				4		7. 23	1.566	7.9	N		
14:24				Ç		7.21	.604	10.1	N		
11 1				8		721	414	10.1	N		
11.68				1=	7.10	7.21	.624	10.2	γ		
	Wa	er S	ample	(at	16:11						
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otes_2" w	ell]].	50 X ().	163 = 1	87 = 1	well vo	1 Wc	-18.60	-7.1	0 = 11	.50_	
Co	aduct	+ .	re-din		2 5c.	le in	m 77	/cm		<u> </u>	
<u> </u>	····	(VI. 7		<u></u>				/ ~ ''' !			

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Well No.						(weather,	temp.,soll, c	onditio	ns)	(<u>, n</u> 1.6
Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Temp	Turbidity Y/N	Commen
WT 1657	8.10	18.70	173	2		8.05	.175	10.4	Υ	Lt Gr
15 5				4		7.89	1196	10.4	N	
15:51				Ŀ		7.547	,197	16.5	N	
14:51				۶		781	, 200	10.5	N	
14:54				10		7. 59	. 202	10.5	N	
					5. F. F.					
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Well Purging and Sample Collection

Well No.	Depth to	Depth to	Volume Calculated	Volume Removed	Depth	рН	Cond.	Temp	Turbidity	Comments
Time		Bottom	(gal.)	(gal.)	After			<u> </u>	Y/N	
915 AST		157.6	24.35	F		757	1243	11.2		
10:21				5.		7.5.	1301	112		11.57.
10.4		<u> </u>		75		7.77		11.2		
10 57				12		7.76	·3.c		I	
11 48				125	11.35	`7. 7 7	.300	11.3	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
	101	++-	C	. 11:						
	700	Te.	-3 5 W VI	<u> </u>	3.0					
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Well Purging and Sample Collection

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lethod of Pu											
						_				t. Material	
ump\$⁄_	Manufac	cturerK	eck	Di	ameter <u> 1, 3</u>	Descript (weather,	ion of site_ temp.,soil, co	S _m ondition	15)	ld mid	30
Vell No.	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	рН	Cond.	Тетър	Turbidity Y/N	Comments	
19'05	9.11	61.35	9.49	10		7.46	,454	11.5	2	Muck 5:++	
14:51				20		7.45	.456	11.4	2		
15:a				30		745	,455	11.4	iV		
15:14				40		7 45	.455	113	N		
15:38				50		7.47	.454		W		
					9.25						
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Notes 2" well		WC=67.35	-9:11 - 58 24
58.24 4 5.165	949 galler = 1.	्टा ७०।	
Conductivity	o 2 scale of Ys	SI morlon	
?m./86	Signature	D Shu	Date 1-7-91

Donohue

Well Purging and Sample Collection 1/T-12.2A Engineers & Architects Project No. 20026 023 Site Himes Duma Method of Purging Pumped______Bailed___ Equipment _____ Airlift _____ N2 Lift _____ In. Bailer ____ Length ____ Ft. Material _____ Manufacturer Keck Diameter 1775 Description of site Cold 5-12 12 20 201 (weather, temp., soll, conditions) South 55 moh int no to 10 moh Volume Volume Depth to Depth **Turbidity** Depth to Calculated Removed (gal.) Cond. Comments After Water Y/N Bottom 945 4.00 1.42 730 18.16 1.5 -7-91 560 11.2 7 7.36 3.0 7.28 · 862 11.2 4.5 , 369 111 N 7.28 Ç. 6 7.28 Y . Y 11.1 7.5 9.45 Water Staple 13. 4 WC=18,16-4.45 = 8.71 Notes 0163x 871 = 142 = 1 well val Conductivity Reading on 2 scale in motor Sl. Date 1-7-91

PM./86

TECHNICAL MEMORANDUM NUMBER 9

DATE:

January 28, 1991

TO:

Vanessa Harris - Site Manager

CC:

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSQAM

FROM:

Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump RI/FS

SURFACE WATER/SEDIMENT SAMPLING

Introduction

Surface water and sediment samples were taken at four locations at each of the three ponds at the Himco Dump Site in Elkhart, Indiana, to investigate the degree and extent of surface water and sediment contamination. Sampling was done by Eric Slusser and Tom Puchalski of Donohue & Associates, Inc., on October 17, 18, 19, and 20, 1991. This memorandum describes the sampling methods used in the field as compared to the methods described in the Final Field Sampling Plan.

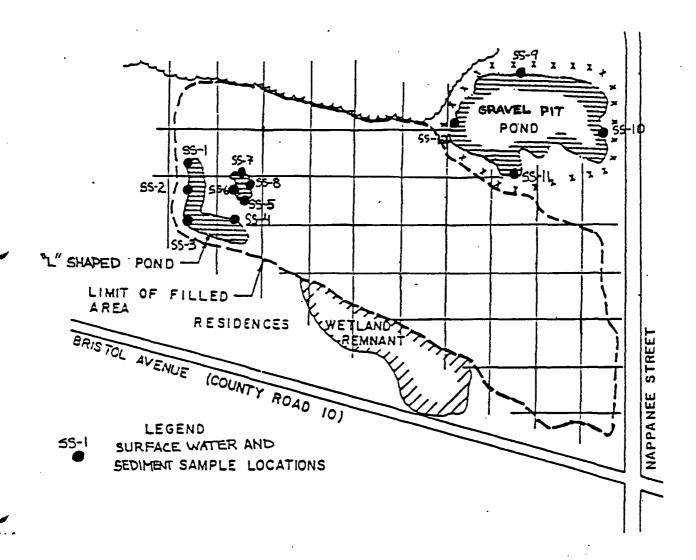
Methods

Three surface water bodies are present at the Himco Dump Site. The two smaller ponds are located at the southwestern portion of the site. The larger of these two ponds is "L"-shaped with the longer channel oriented north-south and the shorter channel oriented east-west. Both channels of the "L"-shaped pond are approximately 100 feet wide and 400 feet long. The smaller pond is directly northeast of the "L"-shaped pond and is approximately 100 by 170 feet. The shorelines and bottoms of these two ponds are generally gravel and sand. Their depths are unknown, but because they were excavated with a backhoe, they are assumed to be less than 15 feet deep.

The gravel pit pond is the largest surface water body on-site. It is located in the northeast corner of the study area. It is approximately 850 feet wide in the east-west direction and 400 to 550 feet wide in the north-south direction. The depth of the gravel pit pond is unknown. The shoreline and bottom is generally gravel and sand.

The four locations at each of the three ponds were selected so that the north, south, east, and west shorelines were sampled (Figure 1). A description of the sampling location was written on the surface water and sediment field data form (Appendix A). A photograph was taken of each sample location.





SOURCE: US EPA, AUGUST, 1986

O 500 1000
SCALE: FEET

SCALE IS APPROXIMATE

Donohue APPROXIMATE SITE SAMPLING LOCATIONS

20026

FIELD SAMPLING PLAN HIMCO DUMP SITE ELKHART, INDIANA



FIGURE 1

Engineers • Armitects • Scientists

The surface water samples were collected before the sediment samples and on different days at all locations. Surface water was collected by lowering the capped sample bottle below the surface and opening it under water to allow the sample to trickle in. The bottle was then capped under water and brought back up out of the water. The water sample was put in a cooler with ice to be transported to the field trailer. Readings of pH, conductivity, temperature, and dissolved oxygen were taken in the back of a pickup truck at the edge of the pond immediately after carrying them from each location (Table 1).

Sediment samples were collected at the same locations as were surface water samples at approximately 2 to 3 feet offshore at water depths which ranged from 0 to 2 feet. A shovel was used to collect the sample from approximately 0 to 4 inches. Sediment samples were placed in a stainless steel bowl, and the excess water was poured off. Grab samples for volatile analysis were immediately placed in two 4-oz. jars with no headspace. The remainder of the sample was mixed using a stainless steel spoon. The resultant homogeneous mixture was spread evenly in the bowl. The sediment was divided into four quadrants. Small portions were taken from each quadrant for each jar until the remaining jars were filled. A visual description, including texture and color, was written on the field data form.

The shovel, sample composite bowl, and mixing spoon were decontaminated between sample locations by:

- 1. Alconox and tap water water wash.
- 2. A tap water rinse.
- 3. An isopropanol rinse.
- Two deionized or distilled water rinses.

Isopropanol rinsates were collected in a 5-gallon bucket and covered until eventual discharge into the on-site frac tank.

Deviations

A shovel was used instead of a bucket to collect the sediment sample because the sediment was consolidated by plant roots in some locations to the degree that a bucket could not scrape up the required sample volume.

Summary of Results

Twelve surface water and twelve sediment samples were collected. No visual evidence of contamination was apparent in any of these samples. Figure 1 shows the surface water/sediment sampling locations, and Appendix A contains the surface water and sediment field data forms, which describe the appearance of the samples.

TP/ke

A/R/HIMCO/AB4

TABLE 1

Sample Number	<u>Date</u>	$\underline{T^{\circ}F}$	<u>pH</u>	Conductivity ms/cm	DO mg/l
SS-1	10/17/90	69	8.11	792	6
SS-2	10/18/90	50.2	8.02	753	9
SS-3	10/18/90	48.5	8.31	704	8.4
SS-4	10/18/90	49.8	8.27	707	8.6
SS-5	10/18/90	49.6	7.93	534	8.4
SS-6	10/18/90	49.4	7.58	538	5.8
SS-7	10/18/90	48.3	7.06	431	3.2
SS-8	10/19/90	46.8	8.06	471	7.2
SS-9	10/19/90	55.6	8.06	637	7.2
SS-10	10/19/90	60.0	7.99	659	6.4
SS-11	10/19/90	61.7	8.00	693	6.7
SS-12	10/19/90	61.7	8.00	693	6.7

A/R/HIMCO/AB4

APPENDIX A SURFACE WATER AND SEDIMENT FIELD DATA FORMS

Donohue	SURFACE WAT	ER FIELD DATA	SITE IDENTIFIER NUMBER
Luqueen, & Architects	& SEDIMENT	CONTAMINATION SUR	
DATE 10/17/90 TIME 8:00 AM COLLECTOR Tom Puch Eric Sus	alski'	TIME 1140 COLLECTOR	17/90
WATER DEPTH 1 - foot		SAME LOC	
ph 8,11 TEMPERATURE OF WATER 1 COLOR Clear DONE None CLARITY Clear - Soune 1	regetation	cep G	brown
cond 792 µs/cm D0 6 ma/l PHYSICAL DESCRIPTION OF SAM POW 15 Past 0	PLING POINT NWC	orner of large off of north s	L shaped fish.
any other characteristics c with a trace of	shang 3/4" po	t is light brown	medium sand
	,		

Donohue	SURFACE WATE	R FIELD DATA	SITE IDENTIFIER NUMBER
Linguages & Architects.	& SEDIMENT	CONTAMINATION SURVEY	. (55-2)50-0
DATE 10/17/40 WATER TIME 800 AM	8/90		SEDIMENT 10/17/90 1440
COLLECTOR ERIC SLUSS	FR		TOM PUCHALSICI
TOH PUCHA	C 5/C		ERK SLUSSEP
DOROTHEA I	OWNS		
WATER DEPTH		ري.	AME LOCHTION
pH 8.02	**************************************		
TEMPERATURE OF WATER5	0.2	280 10/12kg	• ()
color <u>Clear</u>		987 <u>1</u>	brown Grey Sand, blacking
ODOR <u>None</u>			lene Has
	lon turbid		
cond 753 ms/c			n
PHYSICAL DESCRIPTION OF SAM	PLING POINT 125 so	uth of north sho	or of L shaped
fish pond off o	f the west bo	nk. Sandy marly o	dropoff.
,			1
			
			•
	= \(\alpha \cdot \)	• • • • • • • • • • • • • • • • • • • •	
ANY OTHER CHARACTERISTICS O	FNOTE <u>Soviment</u>	is organic rich	
			
_			_

Donohue	SURFACE WATER	R FIELD DATA	SITE IDENTIFIER NUMBER
Engineers & Architects	SEDIMENT	CONTAMINATION SURVE	y (55-3)50
WATER			SEDIMENT
DATE	_	10	0/17/90
TIME	-		3:30 p.m
COLLECTOR ERIC SLUSSER			DM PUCHALSKI
TOM PIXHALSK			RIC SLUSSER
DOROTHEA DOW	INS		·
WATER DEPTH1			
OH JEP LIDEOF 8.	31		
TEMPERATURE OF WATER 48.	5 °F		
COLOR Clear		ì L	Roman Sad
11		7	Brown Sand
odor <u>None</u> clarity <u>Clear</u> - Non to	uchid 2+	3	V UVC
COND 704	W 1514		
DD 8.4			
PHYSICAL DESCRIPTION OF SAMPLIN			- shaped fish
pond 3' south or	f shore for	-sediment 1 off	shord for
surface water			
		 	
		·	
		·	
			
NY OTHER CHARACTERISTICS OF NO	DIE Soundis and	uel shoreling	
Similaring is notice of 110	3113		
			
			
	 		

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Donohue	SURFACE WAT	ER FIELD DATA	SITE IDENTIFIER NU
Encursors & Architects.	& SEDIMENT	CONTAMINATION S	SURVEY . SS-4
WATER			SEDIMENT
DATE IALIBIAD			10/18/90
TIME8335 A.M	(1415
COLLECTOR ERIC SLU		_	SLIJSSER
TON PUCH		_	PUCHALSKI
DOROTHEA		_	
WATER DEPTH	^ +		1-foot
0		-	1 7001
TEMPERATURE OF WATER _			.
color <u>Clear</u>			Brown
DDOR <u>None</u>		<u> </u>	None
CLARITY <u>Clear</u> 707		ا الم	
%.6	۳,	E	
INY OTHER CHARACTERISTIC	cs of Note Sediment	consists of mediu	en arained sound in
NY OTHER CHARACTERISTIC	cs of Note <u>Sediment</u>	consists of media	en grained sand in
ny other characteristic gravelly saud grav	cs of Note <u>Sediment</u>	consists of medicione marl.	en grained sand in
INY OTHER CHARACTERISTIC gravelly sawd grav	cs of Note <u>Sediment</u> rel 3/4-1/8" sbang.	consists of media	un grained sand in
iny other characteristic growly sawl grav	cs of Note <u>Sediment</u> rel 3/4-1/8" sbang.	consists of medicione marl.	en grained sand in
INY OTHER CHARACTERISTIC	cs of NOTE <u>Sediment</u> rel 3/4-1/8" sbang.	consists of media	in grained sand in

Donohue	SURFACE WATE	R FIELD DATA	SITE IDENTIFIER NUMBER
Егороския, 8 Авглива р.	& SEDIMENT	CONTAMINATION SURV	/EY . (\$)-05)
WATER			SEDIMENT
DATE 10/18/90			10/18/90
TIME			1945
COLLECTOR FRIC SLUS		~	SLUSSER
TOM PUCHE		-	PUCHALSKI
DOROTHEA]	DOWNS		
WATER DEPTH			⊒′
pH 7.93			* .
TEMPERATURE OF WATER	49.6		
COLOR Clear	118 12		Brown sand black much
ODOR NONE	·		Has
CLARITY Clour - Non-	turhid		
84 -10			11
PHYSICAL DESCRIPTION OF SAI	mpling point <u>Hiddle at</u>	sown shore of smo	11 DONN HOME FISH DE
			
			
		·	
			
·		u ^	
NY OTHER CHARACTERISTICS	OF NOTE <u>Sediment</u> -	Gravelly sand & mi	ck, gravel-most 1/2
any other characteristics sbang, Sand mel ach		Gravelly Sand & min	ck, gravel-most 1/2
any other characteristics sbowy, Saw me grn		Gravelly Sand & mi	ck, gravel-most /2
any other characteristics sbowy, Sand mel gru		Gravelly Sand & mi	ck, gravel-wost /2
any other characteristics sbang, Sand med gru		Gravelly Sand & mi	ck, gravel-most h
any other characteristics sbang, sand mul gru		Gravelly Sand & mi	ck, gravel-wost /2
INY OTHER CHARACTERISTICS Shang, Sand mel grn		Gravelly Sand & Mi	ck, gravel-most /s

Donohue	SURFACE WATER	FIELD DATA SI	TE IDENTIFIER N
Employers & An Interfer	& SEDIMENT	CONTAMINATION SURVEY	(\$\frac{1}{2}\frac{1}{
WATER DATE 10/18/90		SEDINE 10/20/9	
TIME 11915 AM		805	
COLLECTOR ERIC SLUS		TOM PUCHE	ILSKI
TOM PUC		ERIC SLUS	SER
DORUTHEA	DOWNS		
WATER DEPTH			
pH7 <u>,58</u>			
·	49.4		1
COLOR <u>Light brown</u>	to clear	It brown so	ind
odor <u>None</u> clarity Slia <i>wt tur</i>	1.11	_ None_	
COND	65 P		
DO 5.8		11 f 1. 1	١ ١١
		south of north share of	and Ilms
- L shaped fish po	nd on west bank 2	2'offslow	
<u> </u>	,		
ANY OTHER CHARACTERISTICS	OF NOTE C. A		
NY OTHER CHARACTERISTICS	OF NOTE Sediment sam	ple is gravelly sand, I	ight book
modium sand 75%	OF NOTE Sodiment sam, angular, course an	ple is gravelly sand, I gular sand 10%, 1	ight bown
any other characteristics modium sand 75%, araye!	OF NOTE Sodiment sam, angular, course an	ple is gravelly sand, I gular sand 10%, 1	ight bown
modium sand 75%	OF NOTE Sadiment san	ple is gravelly sand, 1 gular sand 10%, 1	ight brown
modium sand 75%	OF NOTE Sadiment san	ple is gravelly sand, I gular sand 10%, 1	ight brown

C

E SEDIMENT CONTAMINATION SURVEY WATER DATE 101/19/10 TIME 1135 AM 101/10/10 COLLECTOR DAROTHEA DOWN'S TON PUCHALSKI ERIC SLUSSER FILL "LUSSER TOM PUCHALSKI WATER DEPTH 1' PH 7.06 TEMPERATURE OF WATER 48.3°F COLOR Light brush COND 431 DO 3.2 PHYSICAL DESCRIPTION OF SAMPLING POINT Middle of norths share of small pond in cattails. Shaen an uniter - metallic gray. ANY OTHER CHARACTERISTICS OF NOTE Sediment is fine grained angular sand with a trace of slord gal 2 M" dia. SM - Silty sand 20% sand with a trace of slord gal 2 M" dia. SM - Silty sand 20% sand	Donohue	_	ER FIELD DATA	SITE IDENTIFIE	
WATER IOINE/O TIME 1135 AM SSY AM COLLECTOR DOROTHEA DOWNS FRIC SLUSSER TOM PUCHACSK! MATER DEPTH 1' OH 7.06 TEMPERATURE OF WATER 48.3°F COLOR Light brown COLOR Stakt HaS CLARITY Slight turbic COND 431' DO 3.2 THISTOLORISH Share of simul pand in cattais. Shaen on water metallic gray	Empreses & An interes	& SEDIMENT	CONTAMINATION SI	JRVEY G	<u>8</u>
SHEMPERATURE OF WATER 48.3°F COLOR Light brown DOOR Stight 425 CLARITY Slight turbic COND 431 DO 3.2 PHYSICAL DESCRIPTION OF SAMPLING POINT Middle of north share of small pand in cattails. Sheen on water - metallic grey.	WATER DATE 10/18/90 TIME 1135 AM COLLECTOR NOROTHEA ERIC SLUSS	SER		10/20/90 834 AM On PUCHALSKI	
CLARITY Slight turbic COND 431 DO 3.2 PHYSICAL DESCRIPTION OF SAMPLING POINT Middle of north share of small pand in cattails. Sheen on water - metallic grey.	TEMPERATURE OF WATER	48.3°F		Grey Ha	-
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TECHNICAL MEMORANDUM - NO. 10

DATE: January 29, 1991

TO: Vanessa Harris - Site Manager

CC: Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSQAM

FROM: Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump

TEST PITS

Introduction

Twenty test pits were excavated at the Himco Dump Site in Elkhart, Indiana, on November 28, 29, 30, and December 1 to determine if metal drums are buried at the site. All excavations were carried out in Level B personal protection. Excavations were dug by Chris Goodwin and Mike Donohue of John Mathes and Associates, Inc. Air monitoring of the excavation and logging of the pit were done by Tom Puchalski of Donohue & Associates, Inc. Perimeter monitoring downwind of the excavation was done by Anya Kirykowicz of Donohue & Associates, Inc. The purpose of this memo is to describe the test pit excavation methods and results as they relate to the Final Field Sampling Plan.

<u>Methods</u>

Test pit excavation locations were determined by Rob Stenson and Tom Puchalski of Donohue & Associates, Inc., from a magnetic anomaly map produced for the site by STS Consultants. Excavation procedures are described in Section 4.9 of the <u>Final Field Sampling Plan</u>, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana.

A separate memorandum provided by STS Consultants describes the field and data evaluation methods they used to perform the EM, Magnetic survey, and produce anomaly maps (Appendix A).

Once the locations of the test pits were determined and marked on the magnetic anomaly map, their locations were staked in the field by reference to the site survey grid stakes. After defining the work zone with caution tape and setting up the Level B equipment, the excavation was ready to begin. As the excavation proceeded, the Donohue geologist described the types of waste and soil being excavated by completing a trench log. Readings on air monitoring equipment were periodically recorded on an atmospheric monitoring log. Air monitoring was also performed continuously by a second person at the downwind side

of the excavation outside of the work zone. Readings on a PID and OVA, H₂S, %O₂, LEL, and CO were all monitored. Photographs were taken of large metal objects or other objects of significance. The bottom of the pit was defined by reaching the water table or approximately 15 feet, whichever was shallower. Upon completion of the pit, a measuring tape was used to define the depth of the excavation and the depths to any significant waste or soil horizons. Following the completion of trench logs, the excavation was immediately backfilled. Prior to surveying in the trench locations, all were staked with wooden lath and survey tape.

Upon demobilization from the site, the backhoe was decontaminated by steam cleaning at the decontamination pad. Wastewater generated from steam cleaning activities was collected by the decontamination pad and pumped by sump pump from the collection pit to the on-site frac tank.

Deviations

The backhoe was decontaminated once before demobilization from the site. Decontamination was not required upon mobilization or in between test pit locations as described in the Final Field Sampling Plan because no sampling for chemical analysis was performed, and all test pit locations were on-site in areas of former waste disposal.

Summary of Results

Twenty test pit locations were excavated. Each test pit was twenty-five feet long. Some test pit locations were along the same direction and a direct extension of adjoining test pits, in some cases, producing up to a 100-foot long continuous trench. Test pit locations are provided in Figure 1. Completed test pit log forms are included in Appendix B.

Other than a few scarce 55-gallon drum lids, one rusted and crushed 55-gallon drum which may have been a burn barrel for garbage, and a few 25-gallon crushed drums, no significant buried drums were discovered. Other metallic objects were discovered which can account for the observed magnetic anomalies. Excavated metallic objects consist of scrap metal strips and angle iron, pipes, sheet metal, refrigerator condensers, wire, lawn mower parts, car bumpers, metal boxes, car mufflers, and pails.

A summary of the information contained in the trench logs and atmospheric monitoring logs follows.

Trench 1-4

Trenches 1-4 were excavated from northeast to southwest adjacent to each other to form one long 100-foot trench along hummocky terrain. Two iron beams, concrete, and metal pipe was protruding from the ground surface in several places. Grass covered hummocks were approximately six feet higher than the surrounding terrain. The spoils were piled on the down-wind east side of the trench. The trench was originally approximately 5 feet wide but this dimension widened to 10 feet at the north and south 25 feet due to cave-in. The trench depth varied from 6 feet on the northeast end to 12 feet on the southwest.

The stratigraphy of TP-1 through TP-4 can be summarized as follows. A thin 0.5 to 2.0-foot layer of silty sand topsoil fill overlies a white calcium sulfate layer which grades to black at its base. The calcium sulfate layer pinches out in TP-2 but is present as a brown and white silt layer in TP-3. It was not present in TP-4, but is correlative with black and white stringers 2 to 0.5 feet thick.

Municipal waste, from 2 to 5 feet thick, described in detail in the trench log, is present below the calcium sulfate. Water began flowing into the trench at 7 feet so the trench was not excavated deeper on this end. As the trench excavation proceeded south, no new water sources began flowing. TP-2, therefore, was excavated deeper to 11 feet. The waste layer pinched to about one foot thick in TP-2.

Metal objects were found which can explain the anomaly mapped for this area. Scrap metal strips, steel I-beams, metal pipe, sheet metal, and two drum lids were found within the waste layer in TP-1, 2, 3, and 4.

Air Monitoring

Air monitoring of TP-1 through TP-4 produced a high reading of 30 to 40 ppm and a low of 2 ppm on an OVA. No positive readings were produced on the PID, radiation detector, or lumidor. OVA readings down-wind of the trench at the work zone boundary were sporadic. Reading between 10 and 60 ppm lasted about 5 seconds spaced 1 to 2 minutes apart. Readings were not detected 250 feet down wind of the trench.

Trench 5-6

Trenches 5 and 6 were excavated adjoining one another to form one 50-foot trench oriented north-south. This trench was located in hummocky grass covered terrain similar to the location of TP1-TP4. Excavation spoils were piled on the eastern (down wind) side of the trench. The trench width was 5 feet. The depth extended to 14 feet.

The first foot of the profile of these two trenches consist of brown silty sand topsoil fill. Below the topsoil is calcium sulfate which varied in thickness from one to 9 feet. Below the calcium sulfate lenses is black silty sand with wood, plastic wrap, and sheet metal distributed throughout.

The water table was not reached in this excavation. The water source at the north end of TP-5 was perched water contained within the void space of the waste layer from 2-6 feet.

The majority of the metal objects were found at 8 feet in TP-5 and 6. The objects consist primarily of sheet metal. A small metal oven or refrigerator was excavated from TP-6 near the north end at approximately 8 feet.

Atmospheric Monitoring

The OVA was the only air monitoring instrument which had readings above background. Readings from 30 to 100 ppm were registered at the excavation. Downwind perimeter monitoring registered 20-30 ppm, 50 feet from the trench (east), 2 to 3 ppm, 150 feet east,

and 0 at 250 feet. Higher readings averaging 30 to 40 ppm and instantaneous sporadic readings greater than 100 ppm were observed at the 6-foot depth in TP-5.

Trench 7-8

Trenches 7-8 were excavated adjoining one another to form one north-south trench extending 50 feet. These two trenches were excavated approximately 5 to 7 feet wide and stopped at 12 feet where the water table was encountered. The water table was reached before the bottom of the waste; groundwater is flowing through the waste at this location.

The silty sand topsoil is only a few inches thick at this location. Below the topsoil is about 1 feet of calcium sulfate. From 1 feet to the bottom of the pit at 12 feet is mixed waste consisting of paper, wood, fiber templates, plastic bags, black sand, Alka-Seltzer wrappers, bottles and caps, toothpaste samples, and glass bottles.

Metal objects include one unmarked 55-gallon and one unmarked 25-gallon drums. More significant metal objects include metal pipe found at 2 feet in TP-8, car bumpers, refrigerator compressors, sheet metal, and aerosol cans. Markings on aerosol cans suggests one source as <u>Sudden Beauty</u> hair spray and <u>Dristan Hay Fever Spray</u> were most common. Three 55-gallon drum lids were also found. Only one had legible markings marked "Aliphatic Resin."

Native yellow brown sand was encountered near the south end of TP-8 from the surface to the base of the excavation at 12 feet.

Atmospheric Monitoring

Sporadic readings of up to 700 ppm were observed on the OVA. Thirty-two ppm H₂S were observed on the lumidor which periodically set off the instrument alarm. H₂S readings were also sporadic; readings were highest during excavation of calcium sulfate. Perimeter monitoring of the downwind side of the trench exhibited readings of 30 to 50 ppm on the OVA at the work zone tape, and 3 to 6 ppm at 75 feet downwind of the work zone tape.

Trench 9

Trench 9 was excavated from northeast to southwest extending 25 feet. The ground surface at this area is flat and sparsely grass covered. Calcium sulfate is present at the ground surface. The silty sand topsoil is approximately 6 inches thick. Below this thin layer of topsoil is 2.5 feet of calcium sulfate. From 3 to 5 feet, waste was excavated consisting of tires, wood, paper, black sand, Alka-Seltzer wrappers, rubber 1/8-inch bands, and plastic bags.

Few metal objects were excavated from this pit. Three unmarked 55-gallon drums lids and bundles of wire were excavated at about 4 feet.

A lower calcium sulfate layer extends half way across the trench from the northeast end from 5 to 8 feet in depth. Mixed paper and plastic waste make up the majority of the waste from 8 to 12 feet. The water table was encountered at 12 feet where the excavation stopped.

The lower limit of the waste was not reached before the water table was encountered. Groundwater is flowing through waste at this location. As the bottom of the trench filled with groundwater, gas was bubbling up through the water originating from the waste at the base of the trench.

Atmospheric Monitoring

Readings of up to 500 ppm were observed on the OVA during the excavation of TP-9. Most of the OVA readings were from 20 to 100 ppm at the trench. Readings of H₂S up to 38 ppm were observed during excavation and piling of calcium sulfate at the surface. Perimeter monitoring at the downwind border of the work zone exhibited OVA readings ranging from 2 to 90 ppm. Readings 100 feet further downwind were 2 to 7 ppm, and readings 200 feet downwind were 0.8 to 3 ppm. No perimeter readings above background were detected for H₂S or any other monitored parameters.

Trench 10-11

Trenches 10-11 were excavated oriented north-south with TP-10 on the north adjoining TP-11 on the south to form one 50-foot long trench. Spoils were piled on the east side of the trench.

TP 10-11 is located in a partially grass-covered area. The topsoil is about 1 foot thick consisting of yellow brown silty sand. A lens of waste extends about 12 feet south of the north boundary of TP-10. The lens is approximately 2 feet thick and consists of plastic bags, glass and plastic bottles, wood, and paper. The rest of the trench consists of white, black, and gray layers of calcium sulfate. A few scarce 1"x5" boards were found scattered throughout the calcium sulfate. Groundwater was encountered at 8 feet before the base of the calcium sulfate was reached. Very little metal was discovered in this trench. One piece of sheet metal was located 10 feet south of the north edge of TP-10 at 3 feet.

Atmospheric Monitoring

Positive readings of H₂S and OVA were observed during excavating of TP 10-11. No other instruments had readings above background. OVA readings ranged from 10 to 200 ppm at the trench and 0 to 90 ppm downwind of the trench at the work zone tape. H₂S readings ranged from 2 to 14 ppm at the trench with no H₂S detected downwind of the trench outside of the work zone.

Trench 12-13

TP 12-13 were excavated at the south end of the landfill cap at a relatively flat grass-covered area. Two 25-foot long, 5-foot wide trenches were oriented along a northeast trend and adjoined to create one 50-foot long trench. Excavation stopped at 10 feet when the water table was encountered.

Approximately 6 inches of yellow brown silty sand topsoil fill was found covering about 7.5 feet of white calcium sulfate. Some of the fracture faces of the calcium sulfate were yellow. This may relate to the H₂S atmospheric readings obtained during excavation of this material. This layer is relatively thick in this trench when compared to other trenches excavated on-site. At 8 feet, a 1-foot thick layer of waste was encountered within the

calcium sulfate. The waste consists of wood and paper with lesser amounts of sheet metal, rubber sheets, and Alka-Seltzer wrappers. Groundwater was observed to be pouring out of void spaces associated with the waste layer. This black groundwater poured into the bottom of the trench as the excavation proceeded. Gases were observed bubbling up through the groundwater from the calcium sulfate at the base of the trench.

Atmospheric Monitoring

Positive readings of H₂S and readings on the OVA were observed during trenching of TP 12-13. H₂S readings range from 1 to 46, averaging about 7 at the trench. No downwind H₂S was detected during perimeter monitoring outside the work zone. OVA readings range from 20- greater than 1,000 ppm, averaging about 200 ppm at the trench. Perimeter OVA ranged from 10 to 50 ppm, with average readings about 10 ppm. Readings of 1.5 to background were observed 100 feet downwind of the trench.

Trench 14-15

TP 14-15 were excavated at the southwest edge of the landfill cap at a grass-covered flat area immediately west of the slope east up to the top of the landfill cap. The western boundary of fill was excavated at TP 14-15. Two 25-foot long trenches were oriented eastwest and adjoined to make one 50-foot long excavation. Spoils were piled on the north side of the trench. The trench was excavated to 5 feet wide, but sloughing of the sidewalls during excavation widened the trench to up to 15 feet in places.

The stratigraphic profile begins with approximately 1-foot of brown to yellow brown silty sand topsoil. Below this layer is a 1 foot thick layer of white to gray hardened calcium sulfate. Native sand was encountered from 2 to 9 feet. Several zones of black sand approximately 6 inches thick and 6 feet long were found throughout the buff to brown native sand. No water was encountered in TP-14. As the excavation proceeded east, the depth was decreased to 6 feet since no fill material was present below the calcium sulfate at one to two feet. At the eastern-most edge of TP-15, wood debris, a refrigerator compressor, metal pipe, and sheet metal debris were discovered at about 4 feet in depth. Groundwater began pouring out of this area of debris and proceeded to fill the trench with water. Backfilling of the trench began as soon as the water began pouring out. By the time the backfilling was complete, there was excess volume of groundwater which was displaced by backfill material so that a several inch deep by 30-foot wide puddle was left at the west end of TP-14 on the ground surface.

Atmospheric Monitoring

No abnormal readings were observed other than OVA detections. The OVA readings ranged from 1 to 400, averaging less than 20 ppm. Downwind perimeter OVA readings ranged from 0 to 90 ppm, averaging sporadic readings of 20 ppm. OVA readings were sporadic from 1 to 5 ppm 100 feet downwind. The absence of H₂S readings during the excavation of this trench may be related to the relatively little amount of calcium sulfate encountered.

Trench 16

One 25-foot long trench was oriented on a northwest trend at this location. Approximately one-half foot of brownish yellow fine-grained silty sand topsoil was found overlying a one-foot thick layer of calcium sulfate. Waste was excavated below the calcium sulfate. The waste consists of black wood, paper, plastic and glass bottles, rubber, plastic bags, and smaller amounts of sheet metal, metal pipe, and an empty gas container from a small engine. Black groundwater was reached at 4 feet so the excavation stopped at this depth. A few extra scoops were excavated to 6 feet at the southeast end of the trench. These saturated spoils were not removed, but piled in the northwestern end of the trench. This extra excavation was done to attempt to define the lower limit of the waste. Waste continued beyond 6 feet deep.

Atmospheric Monitoring

Reading of H₂S and positive readings on the OVA were observed during excavation of TP-16. H₂S readings range from 2 to 27 ppm at the trench, but were not detected downwind outside of the work zone. OVA readings ranged from 10 to 500 ppm. Perimeter OVA readings ranged from background to 12 ppm. No OVA readings were observed 50 feet downwind of the trench.

Trench 17

Trench TP-17 is oriented on an east-west trend extending 25 feet. The trench was approximately 5 feet wide. A thin (several inch) layer of yellow brown silty sand topsoil fill covers an 8-inch thick layer of calcium sulfate. Below the calcium sulfate, waste was encountered. Approximately 80 percent of the waste is rubber sheets and bands with minor paper, wood, glass bottles, and minor corroded sheet metal and aluminum bars at less than 2.5 feet. Groundwater was encountered at 2 feet in TP-17, so the excavation was stopped at this depth.

Atmospheric Monitoring

OVA readings up to 2 ppm were observed during trenching of TP-17. No other readings were observed above background on any air monitoring instruments either at the trench or downwind of the trench at the work zone perimeter.

Trench 18

TP-18 is oriented along an east-west trend. The excavation was approximately 5 feet wide and 25 feet long. A thin veneer of sandy topsoil covers about an 8-inch thick layer of calcium sulfate. Waste was excavated below the calcium sulfate layer. The waste consists of paper, plastic, rubber, glass, cardboard, one plastic unmarked, empty 55-gallon drum, and metal objects such as a car bumper, and 3x3x5-foot sheet metal box. Groundwater was encountered before the base of the waste at 7 feet.

Atmospheric Monitoring

The OVA was the only air monitoring device which detected air contaminants above background. OVA readings ranged from 2 to 100 ppm at the trench. OVA readings at the

work zone boundary downwind of the trench were sporadic ranging from 1 to 80 ppm. One hundred feet downwind, the OVA readings were down to background.

Trench 19

TP-19 is oriented slightly northeast trending. It is 25 feet long and approximately 5 feet wide. It is located at the northwest corner of the landfill cap.

The stratigraphic column begins with 1 foot of black, organic rich topsoil. From 1 foot to 2 feet, a layer of calcium sulfate was discovered. Below the calcium sulfate layer, waste was excavated. The waste consists primarily of wood, cardboard, glass bottles, beverage cans, and plastic. Small amounts of metal were excavated at the 3-foot depth consisting of a car muffler; two 55-gallon drums lids, unmarked and corroded; and a metal pail. The water table was encountered at 9 feet before the base of the waste was reached. Waste is, therefore, within the zone of saturation at this location.

Atmospheric Monitoring

The OVA was the only air monitoring instrument which had readings above background during the excavation of TP-19. Readings at the trench ranged from background to 2 ppm. Perimeter monitoring at the downwind direction revealed sporadic readings on the OVA which ranged from 0 to 120 ppm. Readings averaged about 50 ppm. Approximately 60 feet downwind from the trench, OVA readings were down to background with sporadic pulses to 5 ppm

Trench 20

TP-20 was excavated at the northeast corner of the site south of the quarry pond. This trench was oriented along a north-south trend extending 25 feet. The trench width varied from 5 to 8 feet.

The stratigraphic profile of this trench begins with a 1-foot thick layer of brown silty sand topsoil. Below the topsoil is a 1-foot thick layer of calcium sulfate. From 2 to 11 feet, waste is present. The waste consists of paper, cardboard, plastic bags, wood, black sand, and minor glass bottles. At the base of the waste, a second calcium sulfate layer was discovered. Groundwater was flowing from the interface of the waste and underlying white to gray calcium sulfate. A crumpled piece of sheet metal, roughly 3x3-foot, was excavated from the calcium sulfate at about the 12-foot depth. The excavation was completed at 13 feet where the water table was encountered.

Air Monitoring

Readings of H₂S and detections using the OVA were the only above background values observed during the excavation of TP-20. OVA readings at the trench ranged from background to greater than 1,000 ppm. Perimeter monitoring at the outside edge of the downwind side of the trench revealed OVA readings of 20 to 80 ppm with an average of 20 ppm. One hundred feet further downwind, the OVA readings averaged 10 ppm and were down to background 150 feet downwind from the trench.

TP/ke

A/R/HIMCO/AB5

APPENDIX A FIELD PROCEDURES AND DATA EVALUATION METHODS FOR GEOPHYSICAL SURVEY

TECHNICAL MEMORANDUM

DATE:

April 30, 1991

TO:

Vanessa Harris, Site Manager

CC:

Roman Gau, Project Manager

Mike Crosser, TŠQAM

FROM:

David L. Grumman, Project Geophysicist

STS Consultants, Ltd.

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J

Donohue Project No. 20026 STS Project No. 026.023 Himco Dump Site

Elkhart, Indiana

GEOPHYSICAL EXPLORATION PROGRAM

Introduction

STS Consultants, Ltd. (STS) was requested by Donohue to conduct combined electromagnetic and magnetic geophysical surveys at the above-referenced site. The objectives of the surveys were to identify and map anomalous zones to help target subsequent site explorations by Donohue. The survey encompassed approximately 60 acres at the Himco Dump Site. The specific geophysical survey areas include the fill areas, the unfilled margins of the dump, and a wetland remnant along the south central boundary of the landfill.

Survey Methods

The geophysical explorations consisted of combined electromagnetic terrain conductivity and magnetometer surveys.

Instrumentation

The electromagnetic (EM) survey was performed using a Geonics EM-31-DL terrain conductivity meter (EM-31) with a DL-55 data logger. The magnetometer (Mag) survey was performed using an EG&G G-856 proton procession magnetometer with two (top and bottom) sensors. The use of two sensors allows the measurement of the magnetic gradient at each survey position. A laptop field computer was used to download and process the field data during the survey. All geophysical survey instrumentation, with the exception of the field computer, were provided to STS by Donohue.



Mobilization and Field Personnel

Equipment operation was checked at STS's Northbrook, Illinois, office prior to mobilizing to the site. The geophysical survey equipment appeared to be in good working order. The STS field survey crew, Mark Stroebel, Michael Monteith, and David Grumman, arrived onsite Monday, October 22, 1990, and met with Ms. Marsha Kuehl and Mr. Tom Puchalski of Donohue to review the geophysical survey objectives and site safety procedures. At that time, a 100-foot by 100-foot staked grid was still being established on-site by a subcontract land surveyor.

Survey Procedures

EM and Mag readings were taken at 25-foot intervals along survey lines spaced every 25 feet. Distances were paced-off between each staked survey grid point. Survey line nomenclature is described further in the addendum to this memo. Consistent instrument orientations were used across the survey area. Only vertical dipole EM readings were taken, and perpendicular EM readings were not taken. Each STS instrument operator maintained a field notebook during the survey and noted conditions including surface obstructions, nearby metallic objects or structures, possible sources of electrical interference, reference points along selected survey lines (for data validation), and skipped readings.

Several base stations were established along the landfill's periphery to monitor magnetometer drift. The results of the base station readings generally showed low level drift in the magnetometer data during the field survey (+/- 75 gammas, approximate). The Mag field data were not adjusted to compensate for these low level variations during the data reduction. Selected survey points were also used to monitor drift in the EM readings; however, only negligible variations in the EM base station data were observed and drift corrections were not made.

Data Reduction

The field data were returned to sTS's Northbrook, Illinois, office for data reduction and contouring. The data reduction steps for the magnetometer data consisted of: converting field data files to binary format, merging data files, gradient processing, grid position assignments, adjustments for erroneous and/or missing data, conversion of files to contourable ASCII (x-y-z) format for contouring, and computerized data contouring. A similar procedure was used to isolate the top and bottom Mag sensor readings. The EG&G program MAGPAC was used to reduce the Mag data.

A similar data reduction sequence was used for the EM data and consisted of: grid position assignments, adjustments for erroneous or missing data, separating quadrature and in-phase readings, conversion of data files to contourable ASCII (x-y-z) format, merging data files, and data contouring. The Geonics Ltd. program DAT31Q was used for the EM data reduction.

Deviations

Two field mobilizations were required to complete the survey since the survey grid had not been completed during the first mobilization. Field data from overlapping survey lines from both field efforts were evaluated and found to be consistent and generally reproducible between mobilizations.

An analysis of the Mag gradient data showed that the top sensor malfunctioned erratically during the survey, and thereby rendered the top sensor data unusable. The erratic data occurred at unpredictable intervals and appeared related to a sensor or instrument error. The anomalous top sensor readings did not match data trends in the more stable bottom sensor data. Consequently during data reduction, the bottom sensor total field data was isolated, reduced, and contoured.

The wetland remnant area was surveyed using an approximate grid system set-up by STS since no grid had been established by the land surveyors in this area.

Summary of Results

Over 3,000 site grid points were surveyed using the magnetometer and EM techniques.

Magnetometry Results

The contoured results of the magnetic data show several magnetic anomalies on-site. Figure 1 illustrates the contoured total field data (bottom sensor) and identifies the anomalies considered significant and not related to cultural interferences. These anomalies ranged between plus or minus 1000 to 4000 gammas in magnitude. Background magnetism appeared to be approximately 56750 gammas. A partial listing of some of the larger anomalies is as follows:

- Southeast-central region, directly north of site entrance.
- South central area, approximately 300 feet north of the remnant wetland.
- West central area (10, M).

EM Results

The contoured quadrature and in-phase EM data show several very large anomalous regions on-site (50 to 500 mmhos/m). More discreet anomalies are not easily resolved from the extensive quadrature anomalies, although several more localized in-phase anomalies (10 to 40 ppt) are apparent. Background levels were considered to be in the range of 10 to 40 mmhos/m for the quadrature phase and 0 to -2 ppt for the in-phase readings. Figures 2 and 3 illustrate the contoured quadrature and in-phase EM data, respectively. The extent of the large quadrature phase anomalies appears to highlight the approximate limits of filling, and shows that the surveys did provide minimal coverage beyond the fill boundaries. The in-phase data is considered more useful in the identification and mapping of conductive waste burial areas, i.e., areas which could contain concentrations of barrels, metal scrap, or highly conductive buried wastes. A partial list of the most significant in-phase anomalies includes:

- Southeast central area, north of site entrance.
- Southeast central, northwest of site entrance.
 - Northeast central, south of former grave pit. Entire central region of landfill.

Data from the wetland remnant do not appear to show significant anomalous Mag or EM levels, as no readings appeared to be elevated above what would be considered background levels for sand soils. The quadrature data ranged between 2 and 20 mmhos/m. The wetland data was not included in the contoured data since the wetland survey grid could not be reliably tied into the site survey grid.

RS/ke

A/R/HIMCO/AH2

ADDENDUM TO TECHNICAL MEMORANDUM

Grid Position Nomenclature

Several survey positioning schemes were used during the survey. The land surveyors established a 100-foot by 100-foot staked grid using numbers (1-25) along the east-west axis (increasing eastward), and letters (A-U) along the north-south axis (increasing northward). Station A-25 was very close to the southeast corner of the survey area. STS adopted a geophysical survey line/station reference scheme by designating land survey line No. 25 as geophysical survey line 100, with the line numbers decreasing by 1 for each survey line moving west. Geophysical station numbers were simply the linear distance along each survey line north of the A line, where the A line equals 0 north. Finally, during data reduction, line numbers were reassigned to reflect Easting/Northing distances, in feet, by designating station A-25 equal to station 10,000 East, 0 North. The following table schematically presents the line numbering:

Survey Line Reference Nomenclature

Geophysical Field Survey	Geophysical <u>Contour Coordinates</u>
Easting	Easting
100	$10,00\bar{0}$
99	9,975
98	9,950
97	9,925
96	9,900
95	,875
1	7,550
0	7,525
201	7,475
202	7,450
	Field Survey Easting 100 99 98 97 96 95 1 0 201

ns: Not Staked

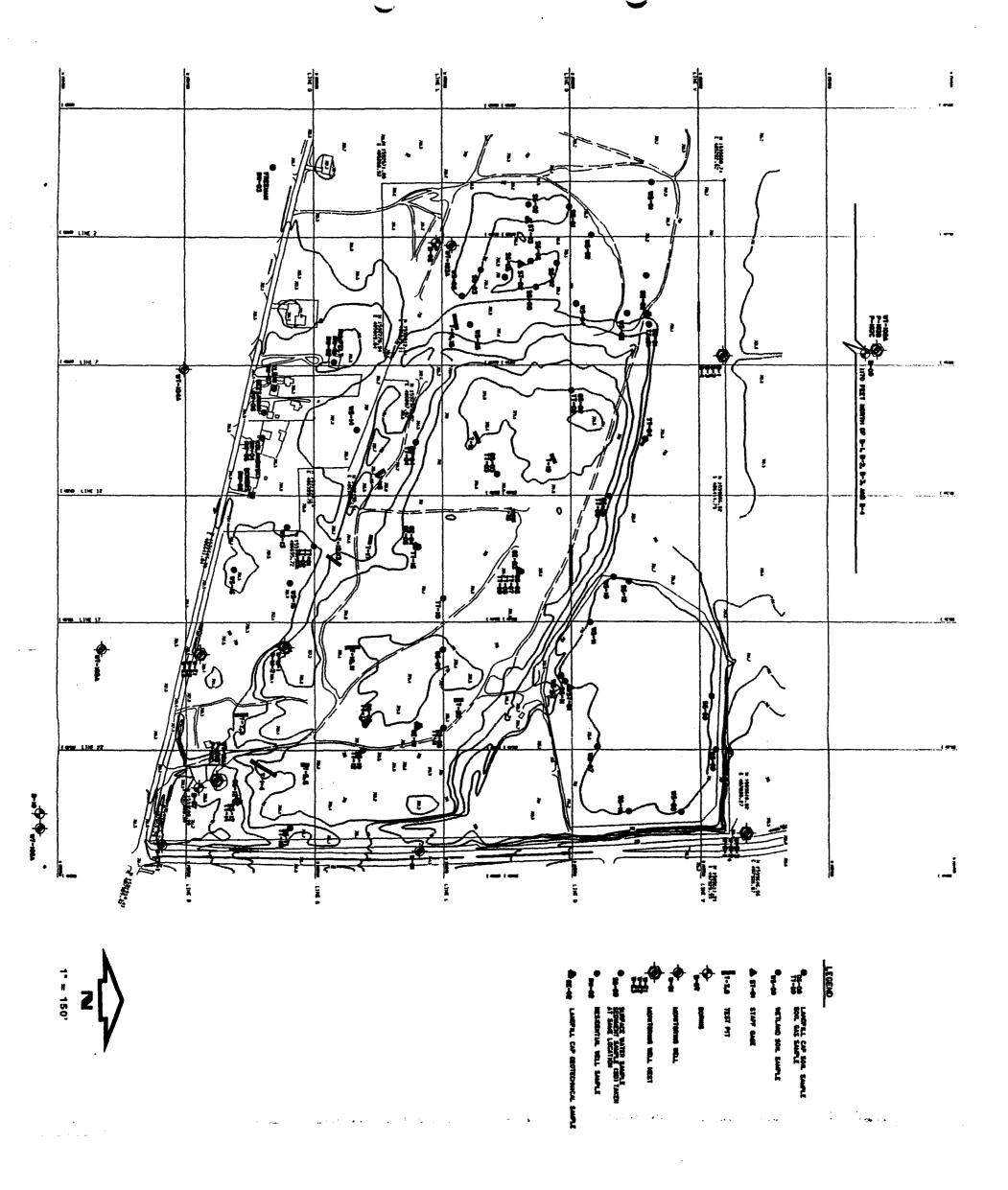
The northing grid spacing was 25 feet, however, the EM meter automatically incremented/decremented this interval. The northing interval is irrelevant to the Magnetometer until data reduction. The range of northing coordinates for the survey area is 0 feet (southeast corner of site) to 2,050 feet (northwest corner of site).

Computer Data Files

The enclosed diskettes contain the following data:

<u>Disk</u>	<u>Files</u>	Comment
3 1/2" Diskette	HHimco1.new,, HHimco19.new DHimco1.new,,	Reduced EM Data files for using DAT31Q
	Himco1.dat,, Himco16.dat	Raw Mag Data files (unreduced)
5 1/4" Diskette	Himco1VQ.xyz	x-y-z data file for EM quadrature data
	Himco1VI.xyz	x-y-z data file for EM in-phase data
Gradiometer	HimcoMG.dat	x-y-z data file for magnetometer
Gradiometer		data (erroneous)
	Himcobot.dat	x-y-z data file for bottom sensor magnetometer data

A/R/HIMCO/AH2

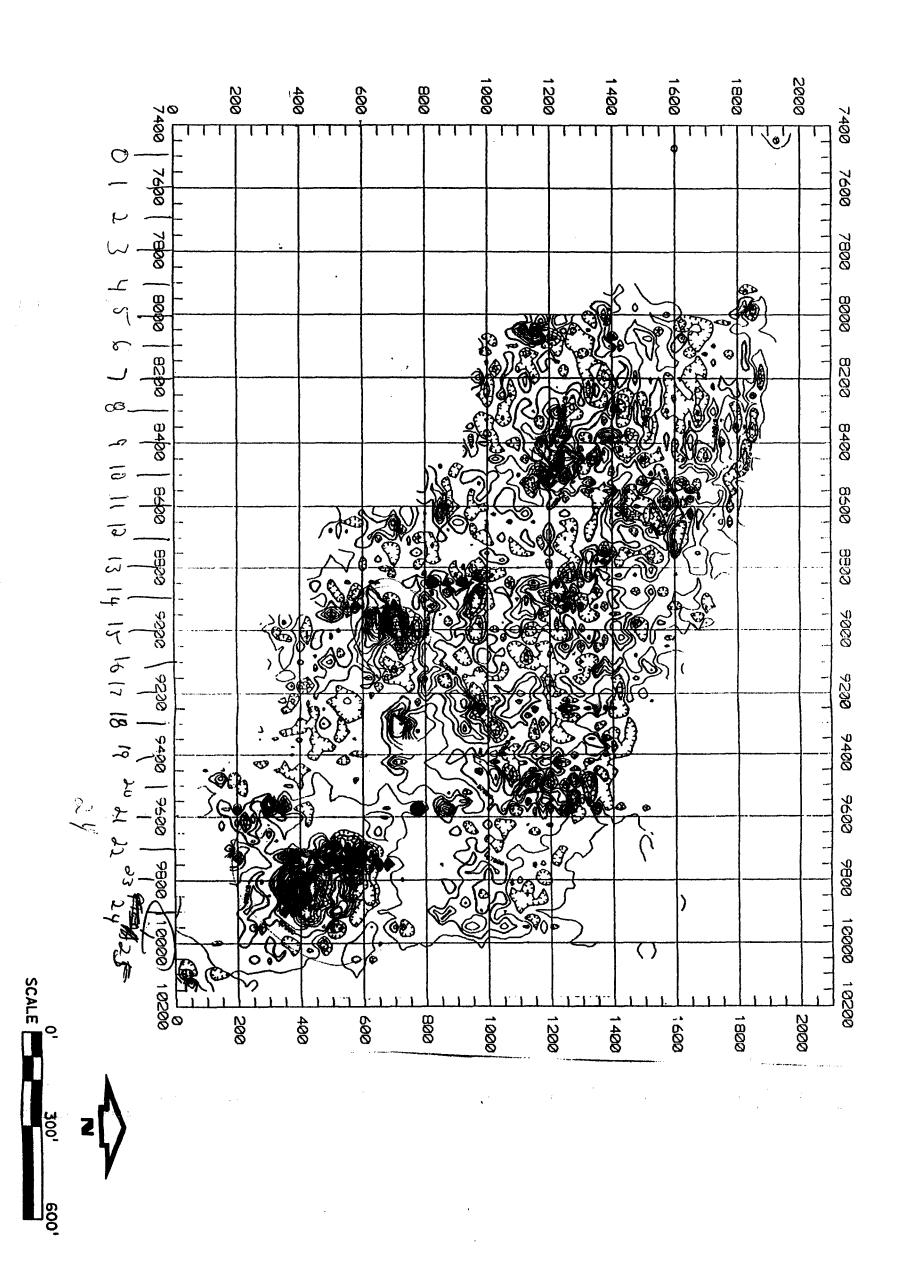


MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



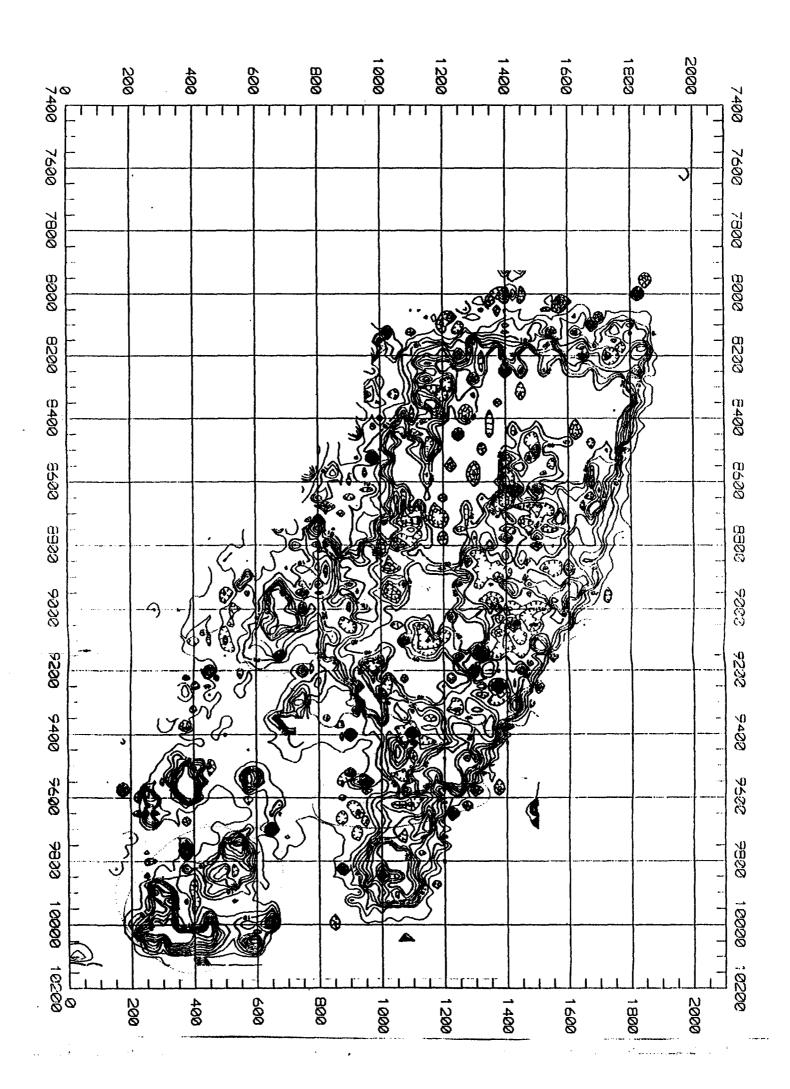


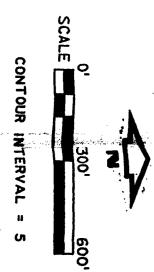
MAY 1891

CONTOUR INTERVAL = 250 GAMMAS

FIGURE 1 MAGNETOMETER SURVEY (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA DONONUO ENGINEERS
ARCHITECTS
SCIENTISTS



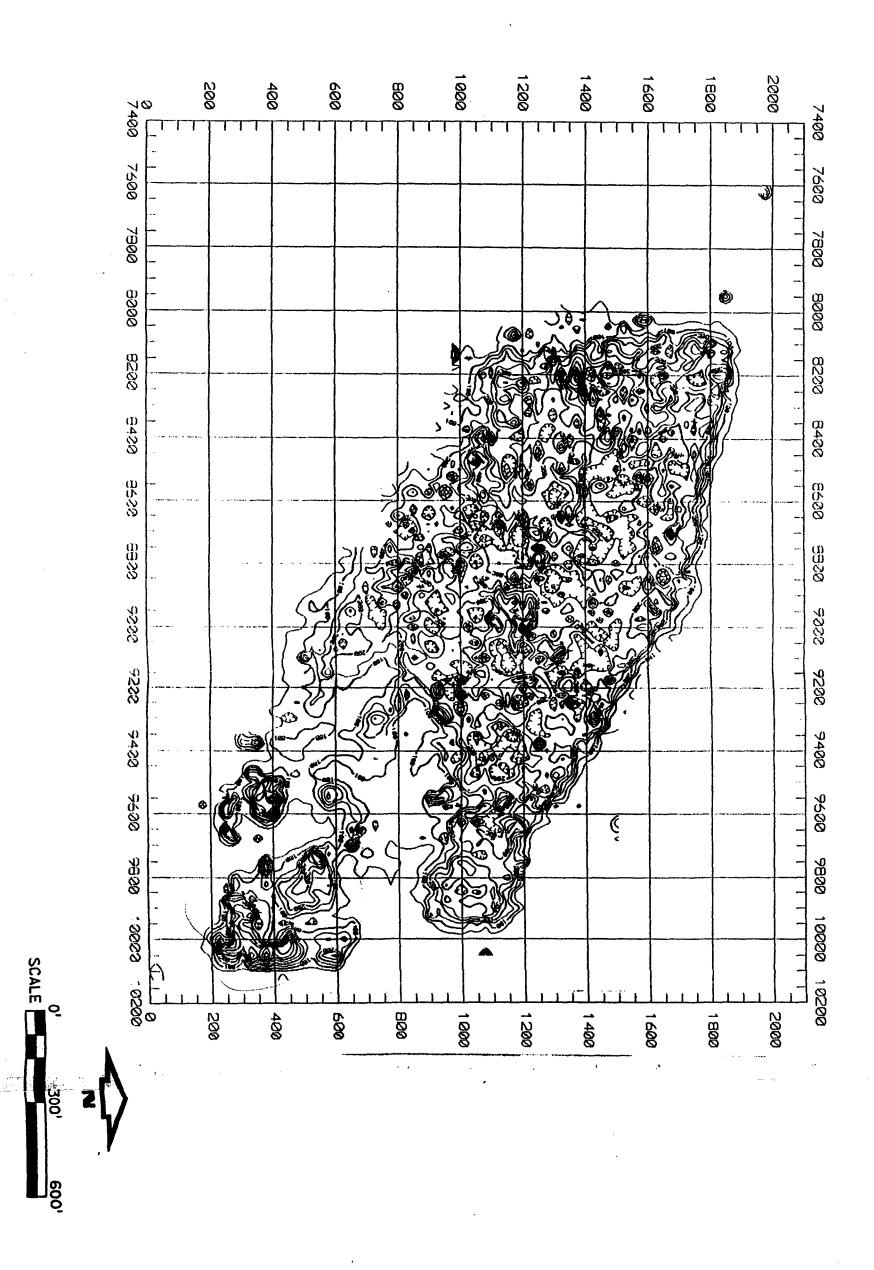


MAY 1981

FIGURE 8 IN-PHASE EM-81 SURVEY (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA





MAY 1881

11

FIGURE 6 QUADRATURE PHASE EM-81 SURVEY (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



APPENDIX B
TEST PIT LOGS

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Donohue										
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	5	Plastic bag	-			ds here				
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END -N E N E TRENCH WIDTH: 5 Ft		
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black sand mixed with White silty scrap metal scrips & debris pipes		
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Pale yellowish silty sand, fungru - Native		
10		
Bottom of pit		
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		Rlack sand metal strips & sscraps - metal corroded, 2 drum	 	ļ
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		Lids, buff sand at base		
			 	
		25Y 7/4 Pale ylw fr green silty sand - Native soil		
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CLIENT: USE PROJECT: HITT PROJECT NO.: OATE: DEC GRID COORD.: CONTROL MONUME ELEVATION, TOP OF	CO 0026.(ember start END NT GRID CO	1, 1990 TRENCH NO.: TP-16 -N E N E TRENCH LENGTH: 0 FT TO 25 FT -N E N E TRENCH WOTH: 5 Feet ORD.: N E N E	
		The supplier of the supplier o	REMARK
STRATA CHANGE OF WATER LEVEL	DEPTH	1 2 3 4 8 6 7 8 8 0 QUANTI	TY NO.
		7 600	
		Black - wood, paper, bottles, rubber, plastic bags. Trace of sheet	_
	19	metal and metal pipe	
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	-		
			
			_
	10		
		Brownish ylw top soil, fine ground silty sand, roots moist.	
	15		
	 		
	20		
	<u> </u>		
	25	<u> </u>	
hemanics: Me tw	tal - 0 1" :	sheet metal - mirror - one sheet, metal gas can from lawnmower with hole in it, 2' metal pipes. Shallow groundwater did not allow deeper excavation.	

					TF	ENCH LOG	FORM						
Donohue													
*4030414	USEPA						1	1					
POJECT: H	INCO	^^7				EXC	ET 1 C	IA.					
ROJECT NO.:	20026. /1/90	023				TRE	BY: TEP	17					
RID COORD.:	START END		EN_	E		TRE	NCH LENGTH: _ NCH WIDTH:	<u>0</u> FT TO	25_ FT				
ONTROL MONUME LEVATION, TOP OF	NT GRID CO	ORD.; N	E	NE_								_	
		W				TRENCHLE	NGTH (FT)					E Deum	REMARK
OF WATER LEVEL	DEPTH	1	2	3	4	•	•	7		•	0	QUANTITY	NO.
		7	80% rub	ber shee	ts and bar	nds, rest	- paper	. wood.	glass, t	race alum	ninum	=======================================	
·	-(-	7								Photo) #I	7	
	5	Ylw bro	own silty	sand (S	17) top so	oil, root	s, moist						
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	ENO	- N	_ [M	·					TRE	ENCH W	ютн:	5 f	<u>t </u>						· · · · · · · · · · · · · · · · · · ·	
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TA CHANGE F WATER LEVEL	DEPTH	1		2	T	3	7			TR	ENCH L		FD.	7				T	•		DRUM	REMARK NO.
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appresent Hi	INCO					_ 8H EX	SHEET 1 of 1 EXCAVATOR JMA (John Mathes & Assoc.) LOG BY: TEP TRENCH NO.: TP-19									
PROJECT NO.:	20026.0)23				LO										
OATE: 12/	<u>/1/90 </u>					TRI	ENCH NO.:	TP-19								
GRID COORD.:	TRATE ONS		N			TA	ENCH LENGTH: _ ENCH WIDTH: _	_ <u>U_</u> _FT10								
CONTROL MONUME			E N			27%	ENCH WIDTH:									
ELEVATION, TOP OF	TRENCH:	vi N			<u>_</u> _			•	•		E					
		TRENCH LENGTH (FT)														
BTRATA CHANGE OF WATER LEVEL	DEPTH	1	2	3	4			7				ORUM	REMARK NO.			
<u> </u>	 		Black	organi	c rich to	psoil		 								
							White Case									
			· mu	ffler,	drum lids	, pail										
																
	5	Wood,	cardboar	d, tras	h, bottle	s, cans,	glass, p	<u>plastic</u>								
	 						 					 				
	 					 	 					 	 			
	V						<u> </u>					 	 			
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DONORUS													
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PROJECT NO.: 2	0026.0)23					G BY: TEP						
DATE: 12/ GRID COORD.:	1/9U .		N	<u> </u>	····	TR	ENCH NO.; 20 ENCH LENGTH: _	0 57.70	25 sr				
	END	- NE	N	E		TR	ENCH WIDTH:	5 - 8 ft					
CONTROL MONUME ELEVATION, TOP OF			EN	!E				•			S	!	
L				5		10 TRENCH	ENGTH (FT)	15		20	25		REMARK
STRATA CHANGE OF WATER LEVEL	DEPTH	IK K	*	x	К	ж	eK .	х	x	20	øK.	OUMNITY	NO.
							top	soil -	brown si.	lty sand CaSO.			
	 -	 				- حروب				Caso		-	
	5	Paper	, cardbo	ard, pla	stic bac	s, minor	glass bo	ttles, w	ood, blac	ck sand			
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TECHNICAL MEMORANDUM NUMBER 11

DATE:

April 29, 1991

TO:

Vanessa Harris

CC:

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSQAM

FROM:

Tom Puchalski

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump Phase I

SLUG TESTING FIELD PROCEDURES AND ANALYSIS

Introduction

Following well development, groundwater monitoring wells listed in Table 1, were slugtested at the Himco Dump. Wells E3, F1, F2, M1, and M2 were installed in 1977 and 1979 by the United States Geological Survey (U.S.G.S.) The remainder of the wells were installed by Donohue for this remedial investigation. The wells were slug-tested to determine hydraulic conductivity of outwash deposits at several points across the site at the depths listed in Table 1. Slug testing was done on December 1, 2, 14, and January 4, 1991, by Cathy Fruehe, Tracy Koach, Anya Kirykowicz, and Tom Puchalski of Donohue & Associates, Inc.

Field Methods

An ORS Environmental Equipment Model EL-200 data logger and pressure transducer were used to collect slug test data. The battery-operated unit translates water pressure into electrical signals within the transducer. The electrical signals are relayed by a cable to the data logger where they are converted and displayed as water level data. The time and water level data are recorded during the test and stored in the data logger memory until the data is sent to a disk or printer for later analysis.

Slug tests were performed as described in Section 4.2.3.3 of the Final Field Sampling Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana. The setup for the slug test began by unlocking the protective casing and using a decontaminated popper tape to measure the static water level and the depth to well bottom. This data was recorded on In-Field Hydraulic Conductivity Slug Test Forms (Appendix B). A 15 or 5 psi transducer was decontaminated with soap and tap water, and a tap water rinse before lowering into the well. The mode which allows the water level to be read on the data logger display was activated so that the depth of water above the transducer could be read while the transducer was lowered into the water. The transducer cable was duct taped to the protective casing when a maximum of approximately 9 feet of water was above the level

of the transducer. A 4-foot long stainless steel slug was slowly lowered down the well until a slight perturbation in static water level was noticed on the data logger LCD display, indicating the slug had intersected water table. The slug was raised a few inches above the water surface as the water level was allowed to equilibrate. After the water level had equilibrated, the data recording mode of the logger was activated simultaneously with lowering the slug 4 to 5 feet into the water. The falling water level and time were recorded in the data logger memory. When the static water level was re-established, the falling head test was ended. A record of the rising water level and time was obtained as the slug was removed from the water. The test was complete when the static water level was reached. These procedures were repeated until all 15 wells were slug tested.

Analysis Evaluation

Slug test data were analyzed using the method of Bouwer and Rice (1976), through the use of a PC-based computer program developed by Donohue & Associates, Inc. The assumptions of the method are that 1) the drawdown of the water table around the well is negligible, 2) flow above the water table (capillary fringe) can be ignored, 3) well losses are negligible, and 4) the aquifer is homogeneous and isotropic.

Deviations

For unknown reasons, the data plots resulting from a small number of tests were not indicative of a normal test. A straight line plot of the natural logarithm of the drawdown plotted against time was not provided, so the analysis could not be performed. A falling or a rising head test or both was successfully run for every previously selected well. Therefore, all the required results were obtained.

Summary of Results

Printouts of the data and data plots of drawdown versus time are included in Appendix A.

Selection of the segment of the data plot of the natural logarithm of drawdown versus time to be used for the calculation of hydraulic conductivity was based upon the following criteria as described in Bouwer and Rice (1976):

- o The straight line portion of the plot of recovery versus time is the valid data to be used in the analysis. An evaluation of the fit of the data to a straight line was accomplished by linear regression analysis included in the program. Most of the regression values indicated a strong linear relationship in the data. This implies that the assumptions of the analysis method are being met.
- o For the wells with rapid recovery times, the first few data points were used in the analysis. If the hydraulic conductivity of the aquifer was significantly different (several orders of the magnitude) from the hydraulic conductivity of the sand pack, sand pack dewatering was accounted for in the analysis.

REFERENCES

- Bouwer, H., 1989, The Bouwer and Rice Slug Test An Update, v. 27, n. 3, pp. 304-309.
- Bouwer, H., and Rice, R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, v. 12, n. 3, pp. 423-428, 1976.
- Freeze, R.A., and Cherry, J.A., 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, pp. 29.

TABLE 1

WELL NUMBER	HYDRAULIC CONDUCTIVITY (cm/s)	BOTTOM DEPTH OF SCREEN	SOIL CLASS+WELL SCREENED IN
M1-RISE	3.17x10 ⁻³	103.24	SP, GP
M1-FALL	1.43x10-3	103.24	SP, GP
F1-RISE	1.21x10 ⁻¹	31.28	*
F1-FALL	4.51x10 ⁻²	31.28	*
F2-FALL	1.27x10-3	147.83	*
F2-RISE	7.37x10 ⁻⁴	147.83	*
M2-RISE	3.69x10 ⁻²	24.76	*
E3-RISE	7.95x10 ⁻⁴	175.65	SP, GP
E3-FALL	4.61x10 ⁻⁴	175.65	SP, GP
P101B-FALL	3.99x10-3	100.47	ŚM
P101C-FALL	1.11x10 ⁻³	166.53	SP
P102B-RISE	3.50x10 ⁻²	67.25	SP
P102B-FALL	3.91x10-2	67.25	SP
P102C-RISE	3.59x10-3	159.96	SP
WT101A-RISE	2.69x10-2	18.70	SP
WT101A-FALL	9.45x10-3	18.70	SP
WT102A-RISE	4.14x10-3	18.18	SP-SM,SP-GP,SM
WT102A-FALL	6.80x10 ⁻³	18.18	SP-SM,SP-GP,SM
WT103A-RISE	4.10x10-2	18.47	SŴ-GW ´
WT103A-FALL	1.86x10-2	18.47	SW-GW
WT104A-RISE	3.89x10 ⁻²	18.69	SP,SW-GW
WT104A-FALL	5.07x10-3	18.69	SP,SW-GW
WT105A-RISE	1.93x10 ⁻²	18.56	ŚP
WT105A-FALL	1.01x10-2	18.56	SP
WT106A-RISE	4.71x10-2	18.50	SP-GP
WT106A-FALL	8.40×10^{-2}	18.50	SP-GP
AVERAGE	2.33x10-2		·

- * Data not available.
- + United Soil Classification System

A/R/HIMCO/AB6

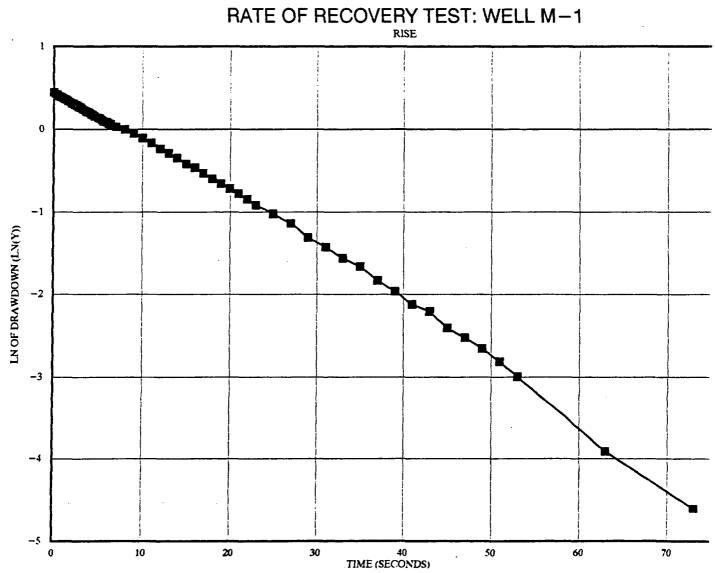
APPENDIX A DATA PLOTS AND ANALYSIS

BOUNER AND RISE METHOD FOR INTERFRETATION OF SLUS TESTS: FCR UNCONTINED AND LEAVY CONFINED ADULFERS.

TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKET BY AN "0".

PROBRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

1	SATIME mantapepte 16:	DRAWDOWN	ITIME sec 1 L	LN :	: EFREJECT NAME :HIMED	
13	1 (X) IMATER Ft.:	181	1 4873 1	(A) !	UPROJECT NG 20026,024 UPELL NO	
'				!	WELL WD :N-1 RISE	!
1 2	1 1 5.42	1.500	1 0.00 10.	.4447 ; .4310)	TAMALYS! :FUCHALSK! 1DATE COLLECTED ::[2-2-90	i
1 3	1 944	1.540	1 0.20 1 0.	41R7 !	TORISE DIGETIES 112-2-70	1977 (radame an 44)
: 4	: 8.49 :	1.490	0.60 0.	3988 :	TEFFECTIVE SCREEN DIAMETER: (2 r sub wi = R.O in. = 0.3	1333 (radius in ft.)
: 5	1 6.50	1.480	0.50 1 0.	7925	IRISER PIPE (ID): (2 r sub c) = 2.0 in. = 0.0 IEFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3 IEFFECTIVE SCREEN LENGTH: (L) = 5.00 Ft. IMGI DRAWDOWN (IN SUPSET): (Year) = 1.55 Ft.	
. ċ	: 5.52 :	1.450	1.60 0.	.784 ;	IMGE DRAWDOWN (IN SUBSET): (Year) = 1.56 Ft.	
. 7	1 : 8.54 :	1.440	1,20 , 0,	546	teratic water Level: (SWL) = 9.98 Ft.	
					IDEPTH FROM SWL TO EFF. SCREEN FOTTOM: (H) = 88.40 Ft.	
: 9	1 : 5.57 ;	1.410	1.60 0.	2436 1	HEST. ADULTER PEPTH ISNL TO ADULTER BOTTOM): (D) = 175	
2.11	: : 5.37 :	: 370	1.50 . 0.	3140 i	IEST. ABOUTER PEPTH ISM. TO WOLTER BOTTOM:: 189 = 175 INCLUDE SAMPACH DEWITERING (ENTER 1 IF YES. 0 IF ND)? ISAMPACK'S SPECIFIC YIELD (SV) = 0.10 BOUNER AND RICE CURVE COEFFICIENTS: RATID OF L/4r sub w) = 15.00 LOE OF L/4r sub w) = 1.1761	ŷ
: 12	1 1 8.60 1	1.360	2.20 1 0.	3075		
1 13	1 : 8.64 1	1.340	2.40 : 6.	2927 :	BOUNER AND RICE CURVE COEFFICIENTS:	1
1 14	: 8.65 ;	1.330	2.60 : 0.	2852 ;	RATID OF L/(r sub w) = 15.00	
: 15	1 1 8.67 1	1.310	2.80 : 0.	2706 1	LOG OF 1/(r sub w) = 1.1761	!
1 16	: 5.68 ;	:.300	3.00 : 0.	2624	FOR PARTIALLY PENETRATING WELLS-	
1 17	5.70 1	1.289	3.20 1 0.1	2469 1	A = 1.93	
1 10	1 1 272 1	1.269	3.40 (0.	2313 i 2151 i	END EIRLY DENETDATING MELLC	
: 20	1 9.75 1	1.250	: 3.90 . 0.	2070 1	For Fore Fereigns and #5555	
21	1 6.76 1	1.220	4.00 1 0.	1989 :	1.30	
22	: 8.7E :	1.200	4.20 : 0.	1823 1	EVALUATION OF LN(Re/(r sub w));	
; 23	1 1 8.79 1	1.190	4.46 (6.	1740 ;	EDNST.1 = 0.1971	
1 24	: : 6.81 ;	1.170	4.60 1 0.1	1570 :	CDNST.2 = 5.5599 =(MAX. OF 6.0)= 5.5	599
25	: ; 8.83 ;	1.150	5.00 ; 0.	1398 ;	LM(Re/(r sub n) = 2.30	:
26	1 8.84 1	1.140	5.20 1 0.1	1310 :-		
1 27	: : B.86 :	1.120	5.40 : 0.1	1133 :	EFFECTIVE r sub c (for sandpack dewatering) = 0.0833	
1 20	i ; 5.55 i	1.100	2.60 10.1	0012 i	11/1/LM(10/10/) (5EUPE) = -0.5UE-U2 5EC(-1)	
1 40	3 0.07 3	1.070	6.00 1 0.1	0477 1	SWARRANGER COMMUNICATIONS (K) = 1 045-04 ft/ser : (=)	
		3 870 3	. 6 70 ! 0.6			
31	: : 8.91 : : 8.92 :	1.060	6.40 : 0.0	05B3 :	3.17E-03 ca/sec (==	**********
; 31 ; 32	: : 8.91 : 1 : 8.92 : : : 8.94 :	1.060	6.40 : 0.0 6.40 : 0.0	0583 : 0392 :	3.17E-03 ca/sec (==	:
; 31 ; 32 ; 33	: : 8.91 : 1	1.060 1.040 1.030	6.40 0.0 6.40 0.0 6.60 0.0	0583 : 0392 : 0296 :	3.17E-03 ca/sec (==	- 0 - 73 5
31 32 33 34	: : : : : : : : : : : : : : : : : : :	1.060 1.040 1.030 1.000	6.40 : 0.0 6.40 : 0.0 6.60 : 0.0 7.00 : 0.0	0583 1 0392 1 0296 1 0000 1		- 0 - 73 5
31 32 33 34 35	; ; 8.91; ; 8.92; ; 8.94; ; 6.95; ; 6.98;	1.040 1.040 1.030 1.000 0.950	6.40 : 0.0 6.40 : 0.0 6.60 : 0.0 7.00 : 0.0 9.00 : 0.0	0583 : 0392 : 0296 : 0000 :		· 0 - 73 s
31 32 33 34 35 36 36 36 36 36 36 36 36 36 36 36 36 36	:	1.040 1.040 1.030 1.030 1.000 0.950	6.40 : 0.0 6.40 : 0.0 6.60 : 0.6 7.00 : 0.6 9.00 : 0.0	0583 : 0392 : 0296 : 0000 : 0513 :	3.17E-03 ca/sec C=	÷ 0 - 73 s
31 32 33 34 35 36 37 37 37 37 37 37 37 37 37 37 37 37 37	: : 8.91 : 8.92 : 1 : 8.95 : 1 : 8.98 : 1 : 9.03 : 1 : 9.08 : 1 : 9.13 : 1 : 9.13 : 1 : 9.13	1.040 1.040 1.030 1.030 1.000 0.950 0.900	6.40 ; 0.0 6.40 ; 0.0 6.60 ; 0.0 7.00 ; 0.0 8.00 ; 0.0 9.00 ;-0.0 10.00 ;-0.1	0583 : 0392 : 0296 : 0000 : 0513 : 1054 : 1625 :		- 0 - 7 3 s
31 32 33 34 35 36 36 37	: : : : : : : : : : : : : : : : : : :	1.040 1.040 1.040 1.030 1.000 0.950 0.900 0.850 0.790	6.20 : 0.4 6.40 : 0.6 6.60 : 0.6 7.00 : 0.6 8.00 : 0.6 9.00 :-0.6 10.00 :-0.1 11.00 :-0.1	0583 : 0392 : 0296 : 0000 : 0513 : 1054 : 1625 : 2357 :	3.17E-03 ca/sec C=	- 0 - 73 s
30 31 32 33 33 34 35 36 37 36 37 37 38 37 38 37 38 37 38 37 38 37 38 37 38 37 38 38 38 38 38 38 38 38 38 38 38 38 38	: 8.91 i 8.92 ! i 8.95 ! i 8.98 i i 8.98 i i 9.03 ; i 9.03 ! i 9.13 ! i 9.13 ! i 9.13 ! i 9.13 ! i 9.13 ! i 9.23 ! i 9.23 ! i 9.27 i 9.23 ! i 9.27 i	1.070 1.060 1.040 1.030 1.000 1.000 1.000 0.950 0.950 0.950 0.750 0.750 0.750 0.750 0.750 0.750 0.710 0.750 0.710 0.750 0.710 0.750	6.40 : 0.6 6.40 : 0.6 7.00 : 0.6 8.00 : 0.6 9.00 :-0.6 10.00 :-0.1 11.00 :-0.1 12.00 :-0.2 14.00 :-0.3	0583 : 0392 : 0296 : 00000 : 0513 : 1054 : 11625 : 2357 : 2877 : 3425 :	3.17E-03 ca/sec C=	- 0 - 73 s
30 31 32 33 34 35 36 37 38 39 40 40 41	: : : : : : : : : : : : : : : : : : :	1.070 1.060 1.040 1.030 1.000	6.20 : 0.4 6.40 : 0.6 6.40 : 0.6 7.00 : 0.6 9.00 : 0.6 10.00 : 0.6 11.00 : 0.6 12.00 : 0.6 12.00 : 0.6 14.00 : 0.3 14.00 : 0.3	0577 ; 0583 ; 0392 ; 0296 ; 00000 ; 0513 ; 1054 ; 11625 ; 2357 ; 2877 ; 3425 ;		- 0 - 73 5
30 31 32 33 34 35 36 36 37 38 36 37 38 36 37 38 38 38 38 38 38 38 38 38 38 38 38 38	: 8.91 i 8.92 i 8.95 i 8.95 i 8.95 i 8.98 i 9.03 i 9.03 i 9.02 i 9.03 i 9.02 i 9.23 i 9.27 i 9.23 i 9.27 i 9.23 i 9.27 i 9.23 i 9.27 i 9.35 i 9.35 i 9.35 i	1.070 1.060 1.040 1.030 1.000 0.950 0.950 0.850 0.750 0.750 0.710 0.660	6.46 : 0.6 6.40 : 0.6 7.00 : 0.6 8.00 : 0.6 9.00 : 0.6 10.00 : 0.6 11.00 : 0.6 12.00 : 0.6 13.00 : 0.2 14.00 : 0.3 15.00 : 0.4	0583 : 0392 : 0296 : 00000 : 0513 : 11054 : 11625 : 2357 : 2877 : 3425 : 4155 : 44620 :		- 0 - 73 s
39 39 40 41 42	7.19 ; 7.19 ; 9.23 ; 9.23 ; 9.32 ; 9.35 ; 9.35 ; 9.35 ;	9.790 6.750 6.710 6.660 6.630	11.00 -0.1 12.00 -0.2 13.00 -0.2 14.00 -0.4 15.00 -0.4	2357 : 2877 : 3425 : 4155 : 4620 :		- 0 - 73 s
39 39 40 41 42	7.19 ; 7.19 ; 9.23 ; 9.23 ; 9.32 ; 9.35 ; 9.35 ; 9.35 ;	9.790 6.750 6.710 6.660 6.630	11.00 -0.1 12.00 -0.2 13.00 -0.2 14.00 -0.4 15.00 -0.4	2357 : 2877 : 3425 : 4155 : 4620 :	Degrees of Freedom 64 J Coefficient(s) -6.50E-02	- 0 - 73 s
39 39 40 41 42	7.19 ; 7.19 ; 9.23 ; 9.23 ; 9.32 ; 9.35 ; 9.35 ; 9.35 ;	9.790 6.750 6.710 6.660 6.630	11.00 -0.1 12.00 -0.2 13.00 -0.2 14.00 -0.4 15.00 -0.4	2357 : 2877 : 3425 : 4155 : 4620 :		- 0 - 73 s
39 39 40 41 42	7.19 ; 7.19 ; 9.23 ; 9.23 ; 9.32 ; 9.35 ; 9.35 ; 9.35 ;	9.790 6.750 6.710 6.660 6.630	11.00 -0.1 12.00 -0.2 13.00 -0.2 14.00 -0.4 15.00 -0.4	2357 : 2877 : 3425 : 4155 : 4620 :		- 0 - 73 5
39 39 40 41 42	7.19 ; 7.19 ; 9.23 ; 9.23 ; 9.32 ; 9.35 ; 9.35 ; 9.35 ;	9.790 6.750 6.710 6.660 6.630	11.00 -0.1 12.00 -0.2 13.00 -0.2 14.00 -0.4 15.00 -0.4	2357 : 2877 : 3425 : 4155 : 4620 :		- 0 - 73 5
39 39 40 41 42	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.39 1 9.43 1 9.45 1 9.55 1	9.790 6.750 6.710 6.650 6.630 6.630 0.590 0.550 0.490 0.460 0.460	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 19.00 1-0.5 29.00 1-0.7 21.00 1-0.7 22.00 1-0.8 23.00 1-0.9	2357 : 2877 : 3425 : 4155 : 4620 : 5276 :- 5978 : 5539 : 7133 : 7465 :		- 0 - 73 s
39 39 40 41 42	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.39 1 9.43 1 9.45 1 9.55 1	9.790 6.750 6.710 6.650 6.630 6.630 0.590 0.550 0.490 0.460 0.460	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 19.00 1-0.5 29.00 1-0.7 21.00 1-0.7 22.00 1-0.8 23.00 1-0.9	2357 : 2877 : 3425 : 4155 : 4620 : 5276 :- 5978 : 5539 : 7133 : 7465 :		- 0 - 73 s
39 : 39 : 40 : 40 : 41 : 45 : 46 : 47 : 48 : 50 : 51 : 51 : 51 : 51	7.19 1 9.23 1 9.27 1 9.32 1 9.32 1 9.35 1 9.39 1 9.43 1 9.49 1 9.55 1 9.55 1 9.58 1 9.	9.790 6.750 6.710 6.650 6.630 6.630 0.590 0.550 0.490 0.460 0.460	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 19.00 1-0.5 29.00 1-0.7 21.00 1-0.7 22.00 1-0.8 23.00 1-0.9	2357 : 2877 : 3425 : 4155 : 4620 : 5276 :- 5978 : 5539 : 7133 : 7465 :		- 0 - 73 s
39 39 40 40 41 42 43 44 45 46 47 48 49 50 51 52 52 52 52 52 52 52	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.39 1 9.45 1 9.45 1 9.55 1	0.790 0.750 0.710 0.660 0.630 0.570 0.550 0.450 0.430 0.430 0.430 0.430 0.430	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.5 20.00 1-0.7 21.00 1-0.8 22.00 1-0.7 21.00 1-0.8 22.00 1-0.9 15.00 1-1.5 15.00 1-1.5	2357 : 2877 : 3425 : 4155 : 4620 : 5276 :- 5978 : 15339 : 7133 : 7455 : 3440 : 9217 : 394 :		- 0 - 73 s
39 39 39 39 40 31 42 43 45 45 46 47 31 49 31 50 31 50 31 52 53 53 53 53 53 53 53	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.45 1 9.55 1 9.55 1 9.55 1 9.55 1 9.56 1 9.57 1	9.790 9.750 6.710 9.660 9.650 9.550 9.550 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 15.00 1-0.4 17.00 1-0.5 18.00 1-0.5 19.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-0.9	192357 12357 12357 13425 14155		~ 0 - 73 s
39 39 39 39 40 31 42 43 45 45 46 47 31 49 31 50 31 50 31 52 53 53 53 53 53 53 53	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.45 1 9.55 1 9.55 1 9.55 1 9.55 1 9.56 1 9.57 1	9.790 9.750 6.710 9.660 9.650 9.550 9.550 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 15.00 1-0.4 17.00 1-0.5 18.00 1-0.5 19.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-0.9	192357 12357 12357 13425 14155		~ 0 - 73 s
39 39 39 39 40 31 42 43 45 45 46 47 31 49 350 35	7 7.19 1 9.23 1 9.27 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.35 1 9.45 1 9.55 1 9.55 1 9.55 1 9.55 1 9.56 1 9.57 1	9.790 9.750 6.710 9.660 9.650 9.550 9.550 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450 9.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 15.00 1-0.4 17.00 1-0.5 18.00 1-0.5 19.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-0.9	192357 12357 12357 13425 14155		÷ 0 - 73 s
38 39 40 41 42 43 44 45 46 47 50 51 52 53 54 55 55 56 57 57 57 57 57	7.19	0.790 / 0.750 / 0.710 / 0.650 / 0.650 / 0.550 / 0.550 / 0.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0	2357 2877 3425 4155 4520 5276 5539 7133 7145 3440 1217 1394 1566 15607 13441 13441 1366 13607 13441 1344	3.17E-03 ca/sec C=	- 0 - 73 s
38 39 40 41 42 43 44 45 46 47 50 51 52 53 54 55 55 56 57 57 57 57 57	7.19	0.790 / 0.750 / 0.710 / 0.650 / 0.650 / 0.550 / 0.550 / 0.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0	2357 2877 3425 4155 4520 5276 5539 7133 7145 3440 1217 1394 1566 15607 13441 13441 1366 13607 13441 1344	3.17E-03 ca/sec C= C= C= C= C= C= C= C	- 0 - 73 5
38 39 39 40 41 42 43 44 45 46 47 50 51 55 55 56 56 56 56 56	7.19	0.790 / 0.750 / 0.710 / 0.650 / 0.650 / 0.550 / 0.550 / 0.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0	2357 2877 3425 4155 4520 5276 5539 7133 7145 3440 1217 1394 1566 15607 13441 13441 1366 13607 13441 1344		- 0 - 73 5
38 39 39 40 41 42 43 44 45 46 47 50 51 55 55 56 56 56 56 56	7.19	0.790 / 0.750 / 0.710 / 0.650 / 0.650 / 0.550 / 0.550 / 0.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0	2357 2877 3425 4155 4520 5276 5539 7133 7145 3440 1217 1394 1566 15607 13441 13441 1366 13607 13441 1344	Degrees of Freedom 64 J Comfficient(s) -6.50E-02 Std Err of Comf. 0.6006	
38 39 40 41 42 43 44 45 46 47 50 51 52 53 54 55 55 56 57 57 57 57 57	7 7.19 / 7.27 7.27 7.27 7.35	0.790 / 0.750 / 0.710 / 0.650 / 0.650 / 0.550 / 0.550 / 0.450	12.00 1-0.2 13.00 1-0.2 14.00 1-0.3 15.00 1-0.4 16.00 1-0.4 17.00 1-0.5 18.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.7 21.00 1-0.8 23.00 1-0.9 23.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0 25.00 1-1.0	28357 1	Degrees of Freedom 64 J Comfficient(s) -6.50E-02 Std Err of Comf. 0.6006	~ 0 - 73 s



BOUNER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEARLY CONFINED ADULFERS. TO UTILIZE THIS MORKSHEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN "1". PROGRAM CAN INCLUDE EFFECTS OF SANDFACH DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDFACK). STIME einispepth to: Drandonn Stime sec : LN : SPROJECT NAME HIMCO (X) INGTER Ft.: (Y) : (X') : (Y) : #PROJECT NO 2002£.024 :N-1 FALL : 1: 1.380 ! 0.00 | 0.3221 | TANALYST :PECHALSKI 11.34 ; 1.366 1 0.20 1 0.3075 1 MDATE COLLECTED :12-2-90 1.53 : !1.33 ; 1.350 : 0.40 | 0.3001 | TRISER PIPE (ID): (2 r sub c) = 2.0 in. = 0.0E53 (radius in ft.) 0.00 : 0.2927 | REFECTIVE SCREEN DIAMETER: (2 r sub w) = 0.50 : 0.2922 | REFECTIVE SCREEN LEMETH: (L) = 11.32 1 1.346 1 5.6 10. = 0.3333 (radius in ft.) 5.96 Ft. : 5: 1.336 11.31 : 1.20 (0.2776) #MA/ DRAWDOWN (IN SUPSET): (Year) 1.320 : -1.3a Ft. 11.30 : 11.20 1 1.40 1 0.2700 1 METATIE WATER LEVEL: (Sel) 1.710 : R: 11.29 ; 1.500 / 1.60 . 0.1524 1 SDEFTH FROM SWL TO EFF. SCREEN BOTTOM: (H) * 99.40 Ft. 1.80 : 0.2546 | MEST. AGUIFER DEPTH (SNL TO AGUIFER BOTTOM): (D) # 175.00 Ft. 1 9 1 1 11.27 : 1.290 : 2.20 : 6.2390 : SINCLUBE SANDFACY DEWATERING (ENTER 1 IF YES, V IF ND)? : 10 1 11.25 : 1.270 : 2.40 : 0.2311 : #SANDPACK'S SPECIFIC YIELD (5v) = 1 11 1 11.74 3 1.760 : 9.10 11.23 ; 1.250 1 2.60 | 0.2231 |----12 1 2.80 : 0.2151 : BOUNER AND RICE CURVE COEFFICIENTS: 11.22 1 1 14 1 11.21 : 1.230 1 3.00 | 0.2070 | RATIS OF L/(r sub w) = 15.00 3.20 | 0.1989 | 1 15 1 11.20 : 1.220 : --- LOG OF L/(r sub w) = 1.1761 1 16 1 11.19 : 1.210 1 2.40 1 0.1906 1 FOR PARTIALLY PENETRATING WELLS--: 17 : 11.16 ; 1.200 : 3.60 : 0.1823 | A = 1.93 1.190 1 4.00 | 0.1740 | : 18 : 11.17 : 0.29 4.20 | 9.1655 | FOR FULLY PENETRATINE WELLE-11.16 1 20 1 11.15 : 1.170 : 4.40 : 0.1570 : ζ± 1.38 : 21 : 11.14 1.160 : 4.60 | 0.1484 | ---EVALUATION OF LN(Re/(r sub w)): 1 22 1 11.13 ! 1.150 : 4.80 : 0.1398 : 23 1 11.12 : 1.140 : 5.00 : 0.1310 : CONST.1 = 0.1971 3 24 1 11.11 1 1.130 : 5.40 : 0.1222 1 CONST.2 = 5.5599 =(MAX. OF 6.0)= 6.40 : 0.1044 : LN(Re/(r sub w) = 1 26 1 11.05 : 1.070 1 7.40 | 0.0677 |-: 27 : 11.02 : 1.040 1 8.40 : 0.0397 : EFFECTIVE r sub c (for sandpack dewatering) = 0.0833 -2.94E-02 sec*(-1) : 28 : 10.99 (1.010 : 9.40 1 0.0100 1 (1/T)(iN(Ye/Yt)) (SLOPE) = : 29 : 10.94 : 0.960 : 10.40 :-0.0408 : :-----11.46 :-0.0619 : THYDRAULIC CONDUCTIVITY : 30 : 10.92 1 0.940 1 (K) * 4.70E-05 ft/sec 0.900 : 12.40 1-0.1054 1 1 1.43E-03 cm/sec ; 31 ; 10.88 : : 32 : 10.85 : 0.870 : 13.40 1-0.1393 1 1-t=0-186.4s ! 33 ! 10.82 1 0.840 : 14.40 (-0.1744) Regression Output: 15.40 :-0.2107 : Constant : 34 : 10.79 : 0.810 : 2.37E-01 16.40 1-0.2485 1 0.1530 : 35 : 10.76 0.780 : Std Err of Y Est 1 36 1 16.73 : 0.750 : 17.40 :-0.2877 : R Souared 0.9841 1 37 1 10.71 1 0.730 | 18.40 :-0.3147 : No. of Observations 58 19.40 :-0.3567 : 20.40 :-0.3857 : 1 30 1 10.68 : 6.700 : Degrees of Freedom ; 37 ; 0.480 ; 10.66 ; -2.94E-02 : 46 1 0.660 : 21.40 1-0.4155 1 I Coefficient(s) 10.64 : 26.40 1-0.5798 1 ; 41 ; 10.54 0.560 : Std Err of Coef. 1 42 1 10.44 0.460 1 31.40 1-0.7765 1 1.43.1 10.37 1 0.390 : 36.40 (-0.7416 :---1 44 1 10.31 : 0.330 : 41.40 :-1.1687 : . 45 : 10.26 : 0.280 : 46.40 (-1.2730) 1 46 1 10.22 : 0.240 : 51.40 1-1.4271 (1 47 : 19.19 0.200 ; 56,40 (-1,4094) v. 180 . 61.49 .-1.7148 44.16 9.150 4 66.40 1-1.8971 1 10.13 : 50 1 10.10 : 6.120 : 71.40 1-2.1203 : 51 : 1 10.09 1 0.110 : 76.40 1-2.2073 52 ; 0.090 16.07 : 31.46 (-2.4679) 0.080 (26.40 (-0.5257) 10.06

10.05 :

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10,00%

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55 ;

58 1

57

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91.40 :-2.6593 1

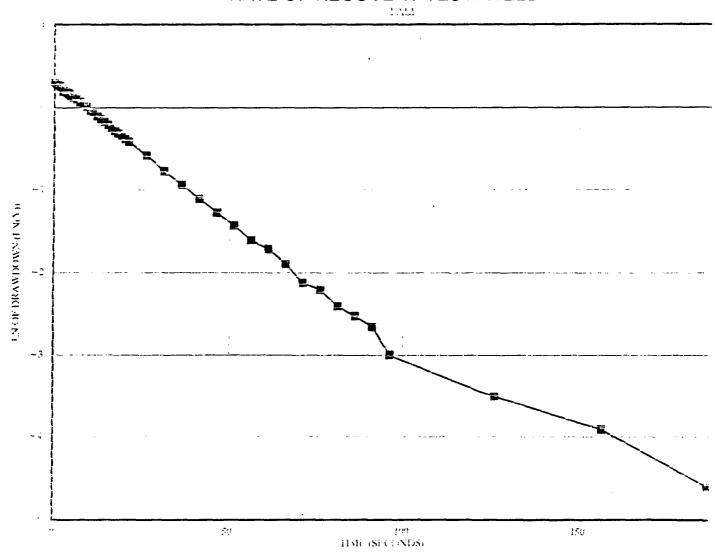
96.40 1-2.9957

126,40 1-3,5065

0.020 1 355,40 (-0.9120 1

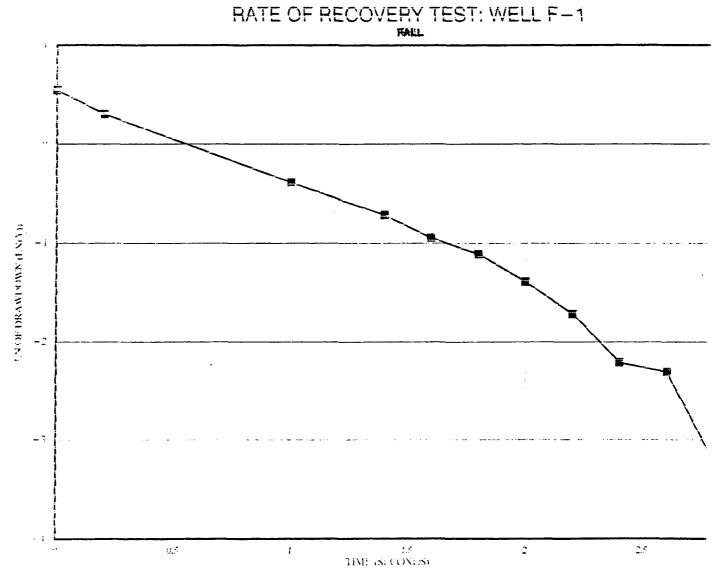
6.010 | 18:.40 1-4.8952 |

RATE OF RECOVERY TEST: WELL M-1



FOUNCE AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEARY CONFINED ADUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED ET AN "Y".
PROSPAIN CAN INCLUDE EFFECTS OF SANDPACK DENATERINS (ASSIMINE WATER IS RISING NITHIN THE SANDPACK).

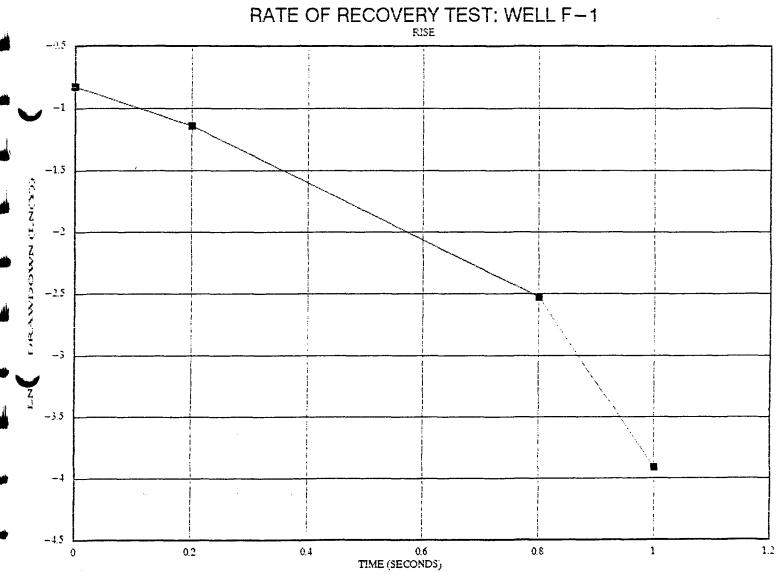
1222	1471	**************************************	SELECTION OF THE	**************************************		esemmenterentarianismenterenterenterenterenterentertetetetete
1 58	1 1 1 2 1	nt sinivetrim lu: (() ::WATER Pt.1	THE TANK	1 1111	1 LN	1 APROJECT NAME HIMCO
		1A:				1 15 50 20 7 80
٠,	:	1 11.78	1.750	1 0.66	1 6.5481	I TARSLYST IFOCHELSKI
- :		11,41 1				1 MATE COLLECTED 112-2-90
: 3						. \$81568 PIPE (18): (2 * sup c) = 1.6 :n. * 6.0832 tradius in ft.)
. 4	:	10.54				
: 5	;	10.44 1	6.390	1.60	1-0.941d	: REFFECTIVE SCREEN DIAMETER: (I'r sub w) = 8.0 in. = 0.3233 (radius in 4t.) REFFECTIVE SCREEN LENGTH: (L) = 5.00 Ft.
: è	1	10.35 1	0.330			: smax DRAWDDWN (IN SUBSET): (Year) = -1.70 Ft.
1 7	1	1 10.30 ;	0.259	2.00	1-1.3963	: SSTATIC WATER LEVEL: (SWL) = 10.05 Ft.
; 8	:	10.23 ;	0.180	2.20	1-1.7146	! «DEPTH FROM SWL TO EFF. SCREEN BOTTOM: (H) ≈ 22.85 Ft.
: 9	;	1 10.16 :	0.110			; sest. ADUIFER DEPTH (SWL TO ADUIFER BOTTOM): (D) # 175.00 Ft.
: 10	}	: 10.15 :		2.60	1-2.3026	: #INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, O IF NO)?
: 11		; 16.09;	•	1 2.80	1-3.2189	: ISANDPACK'S SPECIFIC YIELD (Sv) = 0.10
1 12		10.67 1	• · · · • ·			}
: 13		10.06				1 BOUNER AND RICE CURVE COEFFICIENTS:
14	•	1 10.05 1	0.000	10.00	: ERK	RATID OF L/(r sub w) = 15.00
15		1		;		:L05 OF L/(r sub w) = 1.1761
: 16		- ! !		i	:	FOR FARTIALLY PENETRATING WELLS-
17				:	:	A = 1.93
: 19		; ;		i	:	: B = 0.29 : FOR FULLY PENETRATING NELLS
: 19		1 1		i 1		: FUN FOLLY FENERALING MELLS !
: 21					,	1 L = 1.35
22		; ;			;	:EVALUATION OF LN(Re/!r sub w)):
23				, !	•	
24					•	: CONSI.1 = 0.2602 : CONSI.2 = 6.1235 =(MAX. OF 6.0)= 6.0000
25		: :		!	;	: LN(Re/(r sub w) = 1.98
26					ì	
27		ii		· }	i	: EFFEC?IVE r sub c (for sandoack dewatering) = 0.0833
28		ì		1		(1/T)(LN(Yo/Yt)) (SLDPE) = -1.08E+00 sec^(-1)
29	1	1 1		J		
30	:	: :		ł	;	: :HYDRAULIC COMDUCTIVITY (K) = 1.48E-03 ft/sec : (***********************************
31	;	1 1		ł	•	4 515-02 ra/car ! (***********************************
72	1	: :		!	:	t=0-2.6 s
33	!	: :		!	i	Rediession Anthor:
34		: :		:	:	Constant 6.47E-01
35		: ;	1	;	:	Std Err of Y Est 0.1620
36		: :		}	:	K Squared 0.9750
37	-	1 1	1			ho. of Observations 10
38	•	1	:		:	beorees of Freedom B
39			;			
40						I Coefficient(s) -1.08E+00
41 1		!!!				Std Err ci Coei. 0.0510
42 :						
43		1 1	:		;	



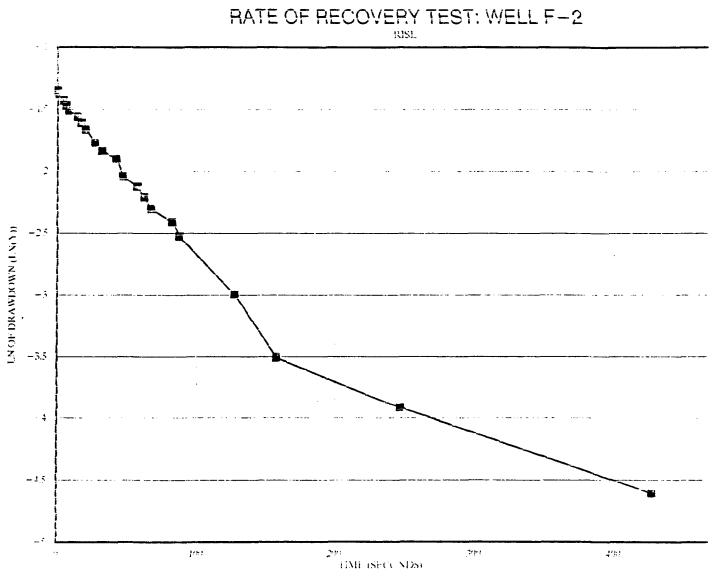
SOURCE AND RICE LETHOS FOR INTERPRETATION OF \$100 TESTS: FOR CACONTINES AND LERKY CONTINES ADUITESS.
FOR THE THIS MORNSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "Y".

HINE E		PROMINENT TOTAL SEC.		・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・	
	DISTER FL.	9	g.,	100 1 BEENEZO WC 1 TO TONIETO TO	
	9 1	7 9	1 2021 1-1 06.0		
24 f.	5.97	6.983	0.80 (-2.5257)	Select Beis Bistiss	# 2.6 in. # 0.0833 fradius in ft.)
3. (10.03	0.020	1.00 1-3.9120	: REFFECTIVE SCREEN DIAMETER:	= 8.0 m. x
					5.00 Ft.
ю- I					-1.31 Ft.
7:				; ISTATIC WATER LEVEL: (SWL)	* 10.05 ft.
to :		••		F. 558	
- ·				; sest, appirer befor ismuit addiffe Editor):	€
5				: TINCLUDE CANCERCO, DENATERINE (ENTER) IF YES. O IF NO??	
=				: ISANDPACY: S SPECIFIC YIELD (SV) =	0.10
12 :					
13 7				BOUNES AND FICE CURVE COEFFICIENTS:	•
¥ :				: RATIO OF L/:r sub w) =	15.00
15				:LOG OF L/(r sub w) =	1.1761
16:				FOR PARTIALLY FENETRATING WELLS	
17 :				: A = 1.93	3
16 :				: B = 0.29	26
19 :			••	FOR FULLY PEWETRATING MELLS	
20 :				C * 1.38	
21 1					
22				OF LN(Re/(r s	1 4
23 :					
	. <u>-</u> -	<i>-</i>		(CO251.2 = 6.1235	S = (MAI, Or 6, G) = 6,0000
2	·• ·				
27 :		~-		: EFFECTIVE r sub c (for sandpack dewatering) =	(atering) = 0.0833
26 :				; (1/T)(LK(Yb/Y1)) (SLOPE) =	-2,88E+00 sec^(-1)
29 :					
: ¥				: : : : : : : : : : : : : : : : : : :	1.71F=0.1 +17561 (************************************
IJ <u>-</u>			-		1
ដ				Regression Output:	
34 ··				: Constant	-
<u>ម</u>	••			: Std Err of Y Est	0.4276
36 :				: R Souared	0.9393
37 :				: No. of Observations	
38				i Degrees of Freedom	22
39 :				:	
46 :				E CORPORATION	* 0.33
=				United Brillians Co.	0.00



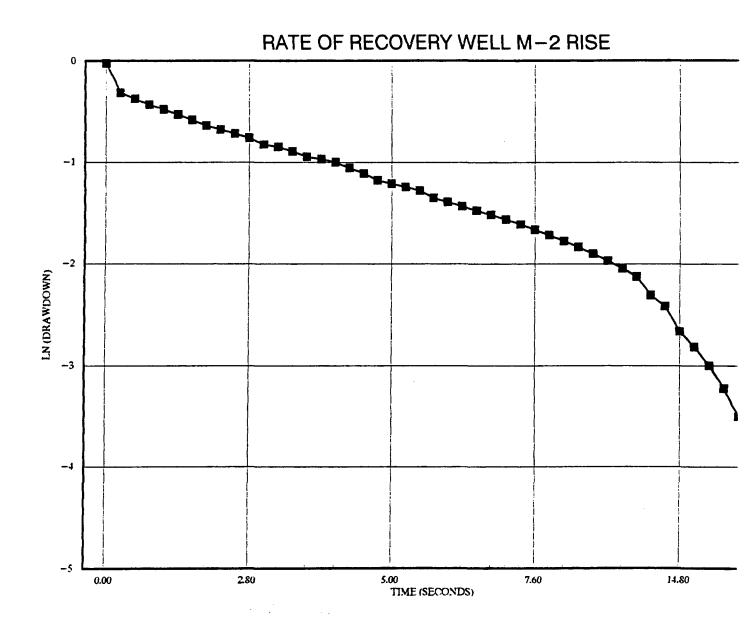


SOUNCE AND RICE METHOD FOR INTEPPRETATION OF SLUB TESTS: FOR UNCONFINED AND LEAVY CONFINED ADDIFERS. TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "A". PROBRAM CAN INCLUDE EFFECTS OF SANDPACK DENATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK). :HIMCG STIME early DESTH TO: DRAWDOWN STIME SEC 1 EN . : SPROJECT NAME (I) INSTER Ft.: (Y) (x1) 1 (Y) 1 SPROJECT NO 20026.024 : :F-[R!5E 0.00 1-1.3471 : #ANALYST 1.9 0.260 : 1.1.1 PUCHALSE! I ADATE COLLECTED : 1: 2.61 5.259 : 1.60 (-1.3983 :12-2-90 4.00 1-1.4271 . #RISER FIPE (10): (2 r sub c) = 0.0833 (radius in ft.) 9.82 0.240 2.6 in. = 6.00 1-1.4697 : SEFFECTIVE SCREEN DIAMETER: (I r sub w) = 9.63 : 6.230 (B.0 in. = 0.3333 (radius in ft.) 9.84 ; 0.226 : 8.00 :-1.5141 : SEFFECTIVE SCREEN LENGTH: (L) 5.00 Ft. 9.85 : 0.210 1 14.00 (-1.5606 : SMAX DRANDOWN (IN SUBSET): (Ymax) 0.26 Ft. 17.00 1-1.6094 : ESTATIC WATER LEVEL: (SWL) 9.86 1 0.200 : 10.06 Ft. 20.00 :-1.6607 : SDEPTH FROM SWL TO EFF. SCREEN BOTTOM: (H) = 9.87 : 0.190 : : 8 : 27.00 (-1.7720) BEST. ADUITER DEPTH (SWL TO ADUITER BOTTOM): (D) = 9.89 : 0.170 1 175.00 Ft. 32.00 1-1.8326 : SINCLUDE SAMPPACK DEWATERING (ENTER 1 IF YES, 0 IF ND)? 10 : 9.96 1 0.160 1 : 11 3 9.91 0.150 : 42.00 :-1.8971 : #SANDFACK'S SPECIFIC YIELD (5v) = . 12 1 9.93 : 0.136 (47.00 1-2.0402 57.00 1-2.1203 : BOUWER AND RICE CURVE COEFFICIENTS: 1 13 1 9.94 : 0.120 1 RATIO OF L/(r sub w) = 9.95 : 15.00 1 14 1 0.110 : 62,00 1-2,2073 1 ---LOS OF L/(r sub w) = 9.96 : 67.00 1-2.3026 1 : 15 : 0.100 : 1.1761 : 16 1 9.97 : 0.090 : B2.00 1-2.4079 1 FOR PARTIALLY PENETRATING WELLS--: 17 : 9.98 1 0.080 : 87.00 1-2.5257 1 A = 1.93 : 16 ; 10.01 : 0.050 | 127.00 |-2.9957 | B = 0.29 FOR FULLY PENETRATING WELLS--1 19 1 10.03 : 0.030 | 157.00 |-3.5066 | 10.04 : 0.020 | 247.00 |-3.9120 | E * 1.39 : 20 : 21 : 10.05 (0.010 : 427.00 1-4.6052 -EVALUATION OF LN(Re/(r sub w)): 1 22 1 * 1.78M02 1 23 1 6.1771 1 24 1 CONST.2 = 3.2677 =(MAX. DF 6.0)= 1 25 1 LM(Re/ir sub w) = : 26 1 EFFECTIVE r sub c (for sandpack dewatering) = 0.0833 : 27 : (1/T)(LN(Yo/Yt)) (SLOPE) = : 28 : -1.29E-02 sec^(-1) : 29 : : 30 : HYDRAULIC CONDUCTIVITY (K) = 2.42E-05 ft/sec /-----: 31 : 7.37E-04 cm/sec **(**************** t=0-1275 : 32 : : 33 : Repression Output: Constant -1.39E+00 : 35 : Std Err of Y Est 0.0292 1 36 1 & Squared 0.9962 1 37 1 18 No. of Observations : 38 : Degrees of Freedom 16 : 40 : I Coefficient(s) -1.25E-02 1 41 1 Std Err of Coef. 0.0002 ; 42 1 : 43 :



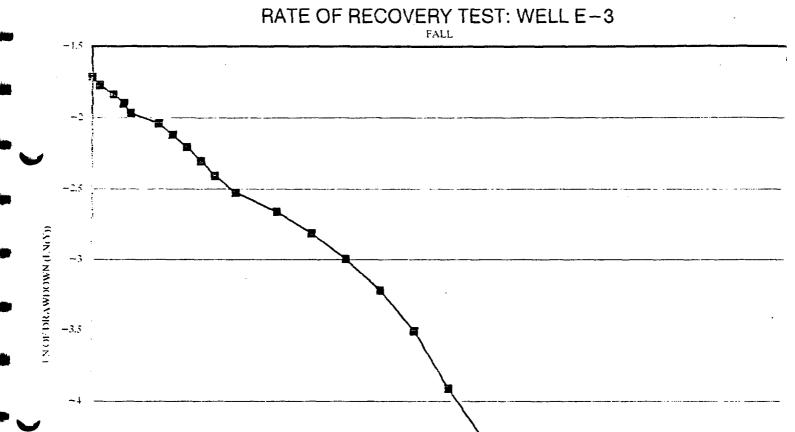
EQUMER AND RICE METHOD FOR INTERFRETATION OF SLUB TESTS: FOR UNCONFINED AND LEARY CONFINED ADUIFERS.
TO UTILIZE THIS WORLSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "E".
FROGRAM CAN INCLUDE EFFECTS OF SANDFACK DEMATERING (ASSUMING WATER IS RISING WITHIN THE SANDFACK).

	#\$118E #1614	BEFTH TO:	PRANDONN	TIME sec :	LN	: #PRGJECT NAME :HIMCG
,	(I) .s	LIEF Ft.:	193	: (x*) :	(y)	PPADECT NO
	.;:	,		:		: #HELL NO :M-2 RISE
ł		5.63	v.=80	0.00	-9.02	: #ANALYST :FECHALSKI
- 2	: :	6.28 (9.730	0.46	-(.31	: #DetE DDLLEGTED
3		0.32 ;	6.690	1.26	-0.37	: #RISEF PIPE (10): (2 r sub c) = 2.0 in. = 0.0823 (radius in ft.) : #EFFECTIVE SCREEN BIAMETER:(2 r sub w) = 8.0 in. = 0.3353 (radius in ft.)
4	: :	5.36	v.c50	1.40	-0.43	: SEFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
5	1	5.39 1	0.620	1.60	-0.49	; SEFFECTIVE SCREEN LENGTH: (L) = 5.00 Ft.
ó	1 1	6.42 1	0.590	1.80	-0.53	: smax DRAWDOWN (IN SUBSET): (yeax) = 0.98 Ft.
7	: :	6.45 1	0.560	2.00	-0.58	: #STATIC WATER LEVEL: (SWL) = 7.01 Ft.
8	1	6.48 1	0.530	2.20	-0.63	: #BEPTH FROM SWL TO EFF. SCREEN BOTTOM: (H) # 9.53 Ft.
9	: :	6.50 :	0.510			: BEST. ADDIFER DEPTH (SWL TO ADDIFER BOTTOM); (D) = 175.00 Ft.
10	: :	6.52 (0.490	2.60	-0.71	: #INCLUDE SANDPACK DENATERING (ENTER 1 IF YES, 0 IF ND)?
!1	:	6.54	0.470	2.80	-0.76	: #SANDPACK'S SPECIFIC YIELD (Sv) = 0.10
12	1 :	e.57)	0.440			
13	: :	6.58	430	3.20 1	-0.84	: BOUNER AND RICE CURVE COEFFICIENTS:
14	:	5.50	0.410	3.40 1	-0.89	: RATIO DF L/(r sub w) = 15.00
15	1 :	6.62	0.390	3.60 :	-0.94	:LOG OF L/(r sub w) = 1.1761
1é	i i i i i i i i i i i i i i i i i i i	6.63 :	0.380	3.80 :	-0.97	: FOR PARTIALLY PENETRATING WELLS
17	1 :	6.64 1	0.370	4.00	-0.99	: A = 1.93 : B = 0.29
18	: :	6.55	0.350	4.20	-1.05	B = 0.29
19	1 1	6.68 :	0.330	4.40 1	-1.11	FOR FULLY PENETRATING WELLS
20	! ! ! !	6.70 3	6.310			C = 1.39
		6.71 [5 00 !	-1 20	1
22	; ;	6.72 :	6.296	5.20 :	-1.24	:EVALUATION OF LN(Re/(r sub w)): CONST.1 = 0.3281 CDNST.2 = 6.2074 =(MAI. OF 6.0)= 6.0000 LN(Re/(r sub w) = 1.74
23	1 1	6.73	0.280	5.40 :	-1.27	CONST.1 = 0.3261
24	: :	6.75	0.260	5.60 :	-1.35	CONST.2 = 6.2074 =(MAX. DF 6.0)= 6.0000
25	: :	6.76	0.250	6.00 ;	-1.39	LNiRe/(r sub w) = 1.74
26		6.77	0.240	6.20 ;	-1.43	
27	1	6.78 :	0.230			EFFECTIVE r sub c (for sandpack dewatering) = 0.0833
28		6.79 1	0.220	6.60	-1.51	(1/T)(LN(Yp/Yt)) (SLOPE) = 1.00E+00 sec^(-1)
29		4.90 :	0.210	6.80 :	-1.56	
30		6.81 1	0.200	7.00 :	-1.61	:HYDRAULIC CONDUCTIVITY (K) = 1.21E-03 ft/sec ; (===================================
31		6.82 1	0.190	7 46 1	-1 44 1	7 (20, 20, 20, 20, 20, 20, 20, 20, 20, 20,
32		£.83 :	0.180	2.00	-1.71	t=0.4-9.8
33		6.84 l	0.170	B.40 !	-1.77	Repression Output:
		6.85 1				Constant -1.73E-18
35		é.Bé !				Std Err of Y Est 0.0000
36		6.87 :				R Squared 1.0000
37		6.88 :	6.130 :			No. of Observations 36
38 :		6.89 :	9.120	11.90 :	-2.12 :	Degrees of Freedom 34
39 1			0.100 :			•
40 :	: !	6.92 1	0.090 1			X Coefficient(s) 1.00E+00
41 ;		6.94 1	0.670			Std Err of Coef. 0.0000
42 :		s.95	0.640			
			0.050			
44 :		5.97	9.040			
45 :	:	6.99		22.60		
	:	5.99 1		27.60		
	. ;					



BOUMER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY COMFINED ADUIFERS. TO UTILIZE THIS WORLSHEEL, ENTER YOUR DATA AT LOCATIONS MARKED BY AN TY. FRORRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING HASSUMINS WATER IS RISING WITHIN THE SANDFACK).

2212	***	***********	********		******	***************************************
:		TIME aun'IDEFTH TO:				
÷	:	(X) WATER Ft.:	(Y) .	(17)	; (A)	1 BERGUETT AD 1 20018-024 : FALL BO 18-10 FA
:						
: }	i	. 3.15				* SANALIST SELIAS
2						1 #DATE COLLECTED 112-1-50
: 3						: tRISER FISE -13/1: 12 f sub c/ = 2.0 in. = 6.0833 (radius in ft.)
: 4	-	6.12				: 8EFFECTIVE SCREEN DIAMETER:(2 r sub w) = 6.0 in. = 0.3333 (radius in ft.)
. 5		8.11				: REFFECTIVE SCREEN LENGTH: (L) = 11.60 Ft.
: 6		8.10				: BMAX DRAWDOWN (IN SUBSET): (Ymax) = -0.13 Ft.
: 7		: 8.09 :				: SSTATIC MATER LEVEL: (SWL) = 7.97 Ft.
: 8		: 6.05 ; : 8.07 ;				! tDEPTH FROM SWL TO EFF. SCHEEN BOTTOM: (N) = 11.60 Ft.
: 10		: 8.07 i				: REST. ADDIFER DEFTH (SNL TO ADDIFER BOTTOM): (D) = 175.00 Ft. : RINCLUDE SANDFACK DEMATERINE (ENTER 1 IF YES. 0 IF ND)? 0
. 10		: 5.05 :				
; 12		. E.V3 ;				: ISANDPAC: SPECIFIC YIELD (Sy) = 0.10
1 13		: 3.05 :				BOUNER AND RICE CURVE COEFFICIENTS:
: 14		1 8.02 ;				
: 15		: 8.61	0.030	93.00	1-3.7737	1 RATIO OF L/(r sub w) = 34.80 1LOG OF L/(r sub w) = 1.5416
: 15		: B.00 :				FOR FARTIALLY FENETRATING WELLS
1 17		7.99	0.030	103.00	1-7 0120	1 A * 2.60
118		7.78	0.010 !	123.00	1-4 4057	; A = 2.60 ; ; P = 0.36 ;
1 19		7.97	0.000 3	197 00	: FRE	FOR FULLY PENETRATING WELLS
: 20					1	: C = 2.03
1 21			i		i	
, 22		iii	i		:	:EVALUATION OF LN(Re/(r sub w)):
1 23		i	i		i	CONST.1 * 0.3099
1 24	1	1 1	:		1	: CDHST.1 = 0.3099 : : CDMST.2 = 6.194B =(MAX. DF 6.0)= 6.0000 :
25	i	1 1	i		i	LN(Re/(r sub w) = 2.24
: 26	:	: 1	;		:	
: 27	ŀ	; ;	1		i	: EFFECTIVE r sub c (for sandback dewatering) = 0.0833
: 28	ŀ	: :	:		1	(1/T)(LM(Yo/Yt)) (SLOPE) = -2.25E-02 sec^(-1)
: 29	:	: :	;			
: 30	ţ	: ;	:		;	: HYDRAULIC CONDUCTIVITY (K) = 1.51E-05 ft/sec ; (***********************************
: 31	1	1 1	:			4.61E-04 cm/sec ; (***********************************
1 32	1	; ;	;		;	t=19-41<
: 33	:	: :	:		:	: Regression Dutout:
3.4	ŀ	1 1	3		ŀ	Constant
35	;	1 1	1		i	Std Err of Y Est 0.0087
1 36		; ;	1		;	R Spuared 0.9982 :
: 37		1 1	:			No, of Observations 6
: 38		: :	:	1	:	Degrees of Freedox 4
: 39		1 1	;	1	t	
: 40		1 1	;	:		1 Coefficient(s) -2.25E-02
: 41			:	1		Std Err of Coei. 0.0005
: 42		1 1	:			;
1 43	:	1 1	:	1	1	***************************************



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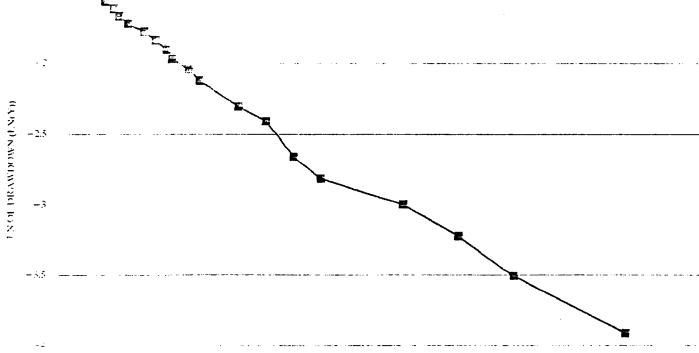
BOSHER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY CONFINED ADDIFERS.
TO UTILIZE THIS MORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "I".
PROGRAM CAN INCLUDE EFFECTS OF SANDFACY DEWATERING FASSIMINE MOTER IS DISING WITHIN THE SANDFACY.

2222		***********	**********	*******	***************************************
	.1718E ain 1967T	A TO BREADONS	TIME sec	LR 1	1 #FRESEST NAME SHIMED
					15R03ECT NO 1 10025,024
					- NEELL NO 1E-7 FISE
. 1					AAAAL157 EELIAS
					# #PATE COLLECTED :12-14-90
, ,		107 1 21200	7.00 1-	1 7007	: RRISER FIPE (1D): (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.) : REFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
: 5					: REFFECTIVE SCREEN LENGTH: (L) = 11.60 Ft.
: 6					
1 7					! tMAX DRANDOWN (IN SUBSET): (Yeax) = 0.26 Ft. ! tSTATIC WATER LEVEL: (SWL) = 7.97 Ft.
: 8					: IDEPTH FROM SNL TO EFF. SCREEN BOTTOM: (H) = 11.60 Ft.
1 5					: JEST. AQUIFER DEPTH (SNL TO AQUIFER BUTTON): (D) = 175.00 Ft.
10					: #INGLUDE SANDFACK DEWATERING (ENTER 1 IF YES, 0 IF ND)?
1 11					: #SANDPACK'S SPECIFIC YIELD (Sy) = 0.10
1 12					
13					: BOUWER AND RICE CURVE COEFFICIENTS:
: 14		.80 i 0.170	: 31.00 :-	1.7720 :	1 RATIB OF L/4r sub w) = 34.80
: 15					:LDS OF L/(r sub w) = 1.5416
: 16					: FOR FARTIALLY PENETRATING WELLS
: 17					: A = 2.60
: 18			47.00 1-		
1 19	1 1 7	.85 : 0.120	1 51.00 :-	2.1203 :	: FOR FULLY PENETRATING WELLS
20	; ; 7	.87 : 0.100	: 65.00 :-	2.3026 :	: C = 2.03
1 21	: 7		75.00 :-		
1 22	; 7	.90 1 0.070	1 85.00 (-	2.6593 (:EVALUATION OF LN(Re/(r sub w)):
23 1	1 7.	.91 : 0.060	95.00 1-	2.8134 ;	; CONST.1 = 0.3099 : CONST.2 = 6.194B = (MRI. DF 6.0) = 6.0000
24	1 7.	.92 : 0.050	1 125.00 :-	2.9957 :	: CDMST.2 = 6.194B =(MAI. OF 6.0)= 6.0000
25	: 1 7.		1 145.00 !-		
26	; 7.	.94 : 0.030	1 165.00 1-	3.5066 :	-
27	: 7.	.95 0.020	1 205.00 :-	3.9120 :	: EFFECTIVE r sub c (for sandpack dewatering) = 0.1318
. 28	;	;	: :	;	: (1/T)(LN(Yo/Yt)) (SLOPE) = -1.55E-02 sec^(-1)
29 1	1	:	1 1		
: 30 /		1 .	: :	:	: INVERABLE COMPACTIVITY (K) = 2.61E-05 ft/sec <===================================
: 31 :	1	1	1 . 1	;	7.9SE-04 cm/sec : (***********************************
: 32 :	1	1	1	;	7.95E-04 ca/sec : 4=4-205
: 33 1	;	;	: :	:	Repression Dutout:
34 1	1	1	: 1		: Constant -1.28E+00
35 ;	1	1	i :		: Std Err of 1 Est 0.020)
. 36 i		i	i i		: R Souered 0.9622
37 :		ì	i	i	No. of Observations 7
39 :		i	:	:	1 No. of Observations 7 1 Degrees of Freedom 5
. 39 i		:		•	· •••••••
40 1					1 Coefficient(s) -1.55E-02
41		:			: Sto Err of Coef. 6.9914
42 1		•	: :		VAVAIT
-		:			·
43	1	i	i i		

RATE OF RECOVERY TEST: WELL E-3

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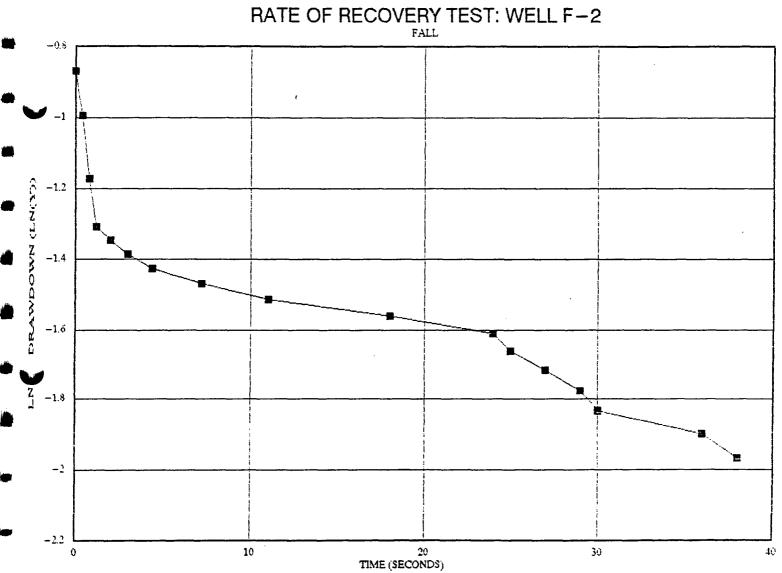
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POUWER AND RICE METHOD FOR INTERSPECTATION OF SLUB TESTS: FOR UNCONFINED AND LEARLY CONFINED ADULFERS.

TO UTILIZE THIS WORLSHEET, ENTER YOUR DATA AT LOCATIONS MARKES BY AN "".

PROGRAM CAN INCLUDE EFFECTS OF SANDRACH DEMATERINS (ASSUMINS WATER IS FISHER WITHIN THE SANDRACH).

:	!17	ike endi	SEPTW TO:	Dienigah	.TimE cor	K	: IFAGJEST NAME :HIMSD
							#FROJECT NO : 20026.024
							TWELL NO 1F-2 FALL
1	:	:	10.48 :	0.420	: 0.00	1-0.9675	I ANALYST :ELIAS
2							: IDATE COLLECTED :12-2-90
: 3	:	;	10.37	0.310	0.80	1-1.1712	: IRISER PIPE (ID): (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
4	;	1	10.33 7	0.270	1 1.20	1-1.3093	: REFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
5	:	1	10.32 :	0.260	2.00	1-1.3471	: REFFECTIVE SCREEN LENGTH: (L) = 5.00 Ft.
6	:	;	19.31 :	0.250	: 3.00	1-1.3863	: smax DRANDDWN (IN SUSSET): (Yazx) = -0.43 Ft.
7	:	7	10.30 ;	9.240	1 4,40	1-1.4271	: ISTATIC WATER LEVEL: (SWL) = 10.06 Ft.
Ð	;		10.29 :	0.230	7.20	1-1.4697	: aperth from SWL to EFF. SCREEN BOTTOM: (H) = 166.25 Ft.
9	ŧ	:	10.28 :	6,220	11.00	1-1.5141	: test. Abulfer bepth (SWL to Abulfer Bottom): (D) = 175.00 Ft.
10	1		10.27 1		15.00	1-1.5606	: #INCLUDE SANDFACK DEWATERING (ENTER 1 IF YES. 0 IF ND)?
11	;	•	10.26	0.200	24.00	1-1.6094	: #SANDPACK'S SPECIFIC YIELD (Sv) = 0.10
12	;	1	10.25	9.190	1 25.00	1-1.6507	
13			10.24				BOUNER AND RICE CURVE COEFFICIENTS:
14		;	10.23				; RATID OF L/(r sub w) = 15.00
15		-	10.22				:LD6 DF L/(r sub w) = 1.1761
16			10.21 :				FOR PARTIALLY PENETRATING WELLS
17		ľ	10.29 1	0.140	38.00	1-1.9661	f A = 1.95 ! R = 0.70
18		;	;		1	•	, v.z.
19		1	1		:	;	FOR FULLY PENETRATING WELLS
20		}	:		:	i	E = 1.38
21		i	;		:	1	
22		i			!		EVALUATION OF LN(Re/(r sub w)):
23		1			i	1	CONST.1 = 0.1771
24		:	:		;	1	CDNST.2 = 3.2677 =(MAX. DF 6.0)= 3.2677
25		:	i		!	1	LHtfre/(r sub w) = 2.71
26		:					######################################
27		i			;		EFFECTIVE r sub c (for sandpack dewatering) = 0.1318
28		:			i		(1/1)(LN(Yo/Yt)) (SLOPE) = -0.88E-03 sec^(-1)
29 30		í			; ,		(HYDRAULIC CONDUCTIVITY (K) * 4.17E-05 ft/sec (====================================
31					· !		1.27E-03 ca/sec (***********************************
32		;	;			, ,	
33		,	;	,	,	,	hearessian Dutaut: t=4,4-29 5
34			•			1 1	-1 40E+00
35				;	!		Std Err of Y Est 0.0122
36		;	;				k Souered 0.9783
37		:	;	· ·			No. of Observations 5
38		;	•	,	!		Repress of Freedom 3
39		:	•	,			**************************************
40		:	:			: :	* Loefizcient(s) -B.2FE-03
41			÷	,			Std Err of Coet. 0.0008
42		•		,			**************************************
43				;		•	



TO UTILIZE THIS WORKSHEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN ***. PROGRAM CAN INCLUDE EFFECTS OF SAMOPACK DEMATERING CASSUMING MATER IS RISING WITHIN THE SAMOPACK). HIMED 20026.024 of 1018 FALL 0.00 1 0.2927 1 TAKALYST . 1: 11.6 1.340 1 :PUCHALSKI 11.57 : 1.110 1.40 : 0.1044 : EDATE EDLLECTED ; 1 3.1 11.55 ; 1.090 ; 1.60 : 0.0862 : #RISER PIPE «18): (2 r sub c) = 2.0 in. = 0.0533 (radius in ft.) 1.80 : 0.0677 : SEFFECTIVE SCREEN DIAMETER: (2 r sub w) = 11.53 : 1.076 1 6.0 in. = 0,3333 (radius in ft.) 2.00 : 0.0488 : SEFFECTIVE SCREEN LENGTH: (L) 5 : 11.51 ; 1.050 : 5.00 Ft. 2.20 : 0.0296 : SMAX DRANDOWN (IN SUBSET): (Ymax) 11.49 1 1.030 : -1.34 Ft. : 61 : ISTATIC WATER LEVEL: : 7 ! 11.40 : 1.020 : 2.40 : 0.0198 (SWL) 10.46 Ft. 2.60 | 0.0000 : ADEFTH FROM SWL TO EFF. SCREEN BOTTOM: (H) = : 9: 11,45 1 0.990 : 2.80 (-0.010) : sest, ABUSER DEPTH (SNL TO ABUSER BOTTOM): (D) * 175.00 Ft. : 10 : 11.45 0.970 1 3.00 1-0.0305 : timelube samppack bewatering (enter 1 if yes. 0 if NO)? 3.20 1-6.6408 1 ISANEPACK'S SPECIFIC VIELD (Sv) = : 11 : 11.42 6.960 ! 6.10 ; 12 ; 11.40 0.940 3.40 (-0.0619) BOUWER AND RICE CURVE COEFFICIENTS: 1 13 1 11.38 : 0.920 : 3.60 1-0.0834 1 1 14 1 11.37 : 0.910 : 3.80 1-0.0943 RATIO OF L/(r sub w) = 1 15 1 11.35 0.890 4.00 !-0.1165 ---LOS OF L/(r sub w) 1.1761 FOR PARTIALLY PENETRATING WELLS--1 16 1 11.34 : 0.880 1 4.20 !-0.1278 : : 17 : 11.33 : 0.870 : 4.40 !-0.1393 ! A = 1.93 P = : 18 : 11.31 9.850 : 5.40 1-0.1425 1 0.25 11.26 0.800 FOR FULLY PENETRATING WELLS--1 19 1 6.40 1-0.2231 1 C = 1 20 1 11.20 : 0.740 : 7.40 1-0.3011 1 1.38 11.14 : 0.680 ; 8.40 :-0.3857 1 21 1 1 22 1 11.09 1 9.630 9.40 1-0.4620 1 --- EVALUATION OF LN(Re/(r sub w)): CONST.1 = : 23 : 11.05 1 6.590 1 19.40 1-0.5276 1 0.1941 CONST.2 = =(MAX. DF 6.0)= 11.40 1-0.6162 3 1 24 6 11.00 : 0.540 : 5.5294 5.5294 : 25 : 10.96 1 0.500 : 12.40 1-0.6931 1 LN(Re/(r sub w) = 2.31 10.93 1 0.470 13.40 :-0.7550 : 27 : 10.89 : 0.430 : 14.40 :-0.8440 : EFFECTIVE r sub c (for sandpack dewatering) = : 28 : 10.86 : 6.400 : 15.40 1-0.9163 1 (1/T)(LN(Yp/Yt)) (SLOPE) = -8.15E-02 sec^(-1) 1 29 1 16.83 : 6.370 1 16.40 :-0.9943 : :-----17.40 :-1.0788 : :HYDRAULIC COMBUCTIVITY : 30 : 10.80 : 0.340 : (K) = 1.31E-04 ft/sec (2522222222222222222 1 31 1 10.78 : (.320 : (252233332222232222 18.40 :-1.1394 3.99E-03 cm/sec : 32 16.75 0.290 : 19.40 :-1.2379 : t=0-44.4s 33 ! 10.72 1 0.260 1 20.40 (-1.3471) Repression Output: 2.59F-01 1 34 1 10.79 : 0.240 : 21.40 (-1.4271) Ennetant 0.0606 : 35 : 6.226 : 22.40 (-1.514) (Std Err of Y Est 10.65 : 23.40 :-1.6607 : 36 : 10.65 : 0.190 (0.9966 R Souared : 37 1 0.170 1 47 10.63 : 24.40 :-1.7720 : No. of Observations : 38 : 10.62 : 0.140 ; 25.40 :-1.8326 : Depres of Freedom 45 1 39 1 16.60 ! 6.140 : 26.40 1-1.9661 1 -E.15E-07 Y Coefficient(s) 1 40 1 10.59 : 6.136 27.40 1-1.0402 1 16.55 ; 28.40 :-2.1203 1 41 1 0.120 1 Std Err of Coef. 6.0007 42 1 10.56 6.100 (32.40 1-1.3026 16.54 1 34.46 1-2.5257 1 43 1 (.020); : 44 : 10.52 36.40 1-1.8134 v.060 .

BOUNER AND RICE METHOD FOR INTERPRETATION OF SLUE TESTS: FOR UNCONFINED AND LEAKY CONFINED ADDIFERS.

40.40 :-1.9957 : 42.40 :-3.1189 :

44.40 1-0.5066 1

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. 44 :

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10.51 :

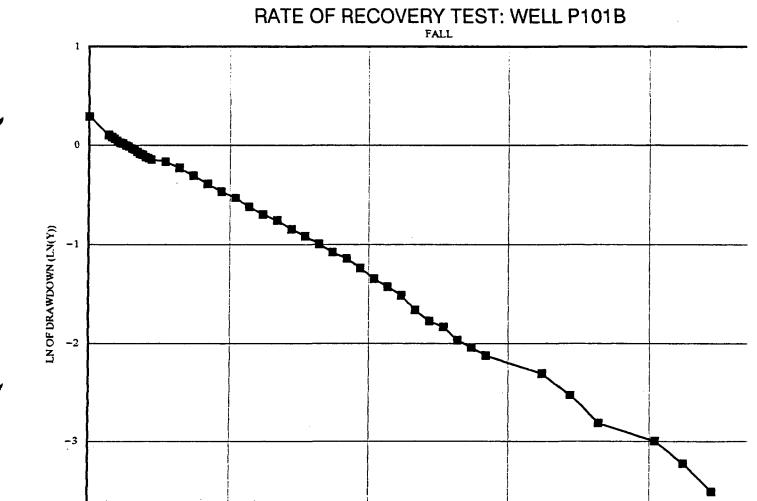
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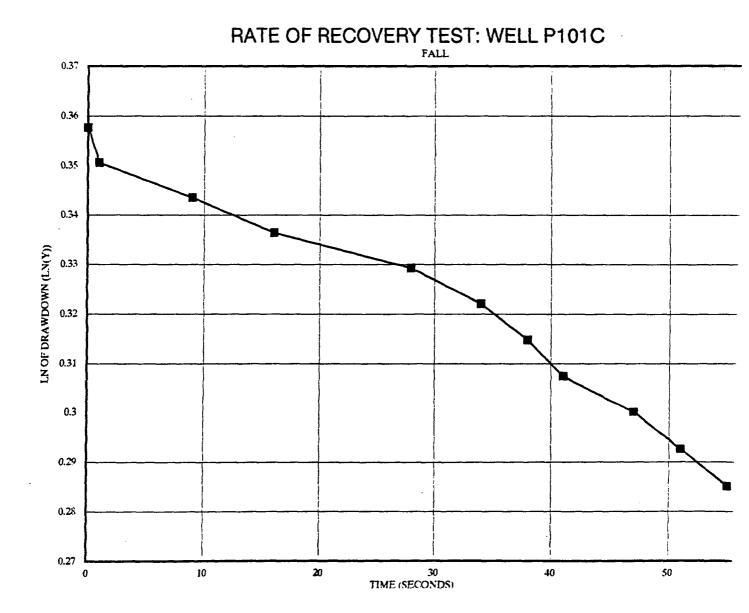
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TIME (SECONDS)

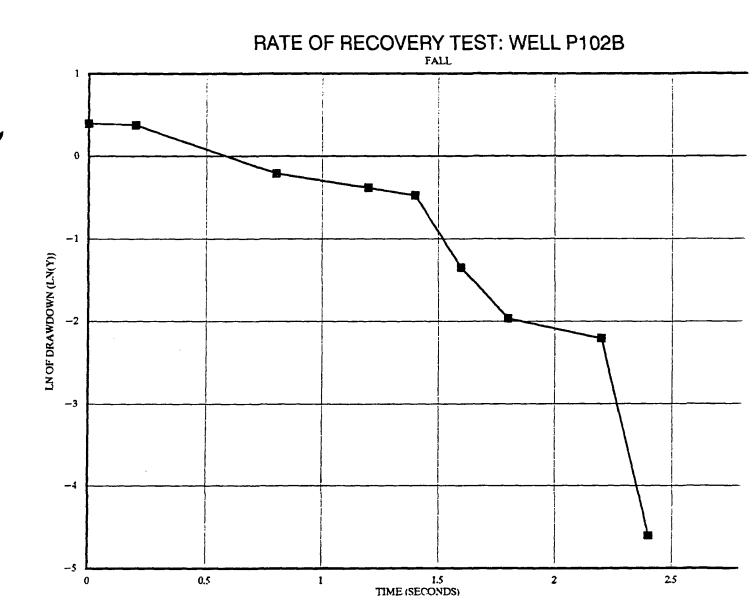
EQUMER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCOMFINE! AND LEAKY CONTINED ADUITERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKET BY AS TELL
PROGRAM CAN INCLUDE EFFECTS OF SANDRACK DEWATERING PRESUMING WATER IS FISHER WITHIN THE SANDRACK).

		****************	INTERNITED IN	**************************************		
						* IFFOREST MAME : HENCO : SMOON ACA
				!		. APROJECT NO : 00005.004 : WHELL NO :FIGUE FREL
. 1	:	11.06				S BANALYST SFUCHALSNI
2	:					SPATE COLLECTED : 04-Jan-91
3			1.410	9.00	0.3436	SRISER PIPE (10): (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
4	1	1 10.57 1	1.400	16.00	0.3365	: BEFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
: 5	1	10.96 :	1.390	28.00	0.3293	: REFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.) : REFFECTIVE SCREEN LENSTH: (L) = 5.00 Ft.
: 6	;	1 10.95				: that Drambonn (IN SUESET): (Year) = -1.38 Ft.
. 7	ì	10.94 1	1.370	38.00	0.3148	: #STATIC WATER LEVEL: (SNL) = 9.57 Ft.
. 8	;	: 10.95 :	1.360	41.00	0.3075	: *DEPTH FROM SNL TO EFF. SCREEN BOTTOM: (H) = 10.85 Ft.
	;	1 10.92		47.00	0.3001	: sest. Aguifer defth (SWL TG Aduifer SCTTDM): (D) = 175.00 ft.
16	;	1 16.91 1	1.340	51.00	0.2927	: #INCLUDE SANDFACK DENATERING (ENTER 1 IF YES, 0 IF NO?? 0
11	;	1 10.90 1	1.530	55.00	0.2852	: #SANDPACK'E SPECIFIC YIELD (Sv) = 0.10
12		; ;		: :		}
13	ŀ	:		;		1 BOUNER AND RICE CURVE COEFFICIENTS:
14		1 :		; ;		: RATIO OF L/ir sub w) = 15.00
15		1 1	1	; ;		:LOG OF L/(r sub w) = 1.1761
16		1 1		; ;		FOR PARTIALLY PENETRATING WELLS
17		1		;		A = 1.93
18		1 1		; ;		B = 0.29 FOR FULLY PENETRATING WELLS
19		1 1	1	: :		
20		1 3		:		; C = 1.38
21		1 1		1		
22		; ;		;		EVALUATION OF LN(Re/(r sub w)):
23		; ;	;			CDMS7.1 = 0.3156 CDMS7.2 = 6.1992 =(MAX. OF 6.0)= 6.0000
24				1		CDNS1.2 = 6.1992 =(MAI, OF 6.0)= 6.0000
25	-					LNiñe/(r sub w) = 1.78
26			i	i		·
27		1 !	į	i		EFFECTIVE r sub c (for sandpack dewatering) # 0.0833
28			i	ì		(1/T)(LK(Yo/Yt)) (SLOPE) = -2.94E-02 sec^(-1)
29 30				:		
31				;	,	HYDRAULIC COMPUCTIVITY
32		; ;	:	:		
33		, ,		;		Repression Dutout:
34		; ;	:	;		Constant 2.37E-01
35					,	Ste Err of Y Est 0.1530
36				,		F. Squared 0.9841
37			•	,		Ho. of Observations SB
35						Degrees of Freedor 56
35			:	,)
40 5		- :	:	,	·	1 Coefficient's -1.945-02
41 3	-			•		Eta Err pi Coef. 0.0005
42						***************************************
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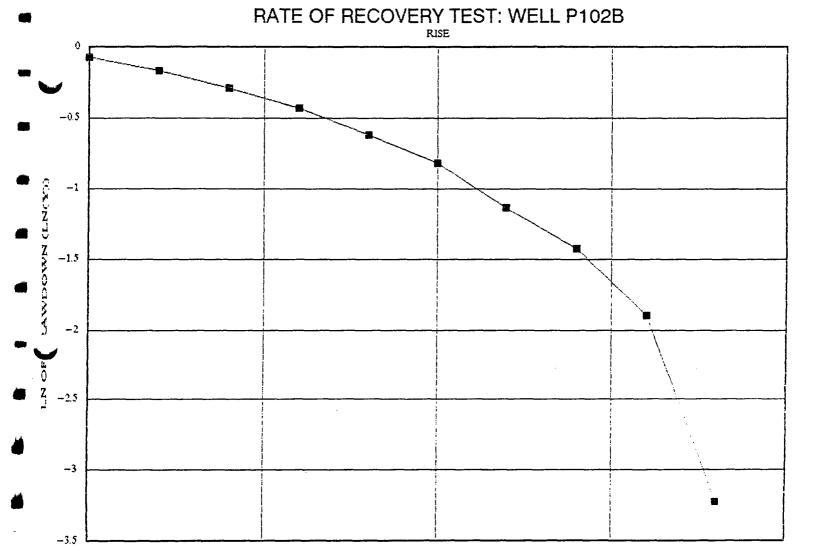
TO UTILIZE THIS MORISHEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN "Y . PROGRAM CAN INCLUDE EFFECTS OF SAMSFACE DENATERING FASEWING WATER IS SIGNA WITHIN THE SAMSFACE). 1 (X) INATER FELL (Y) 1 (X') 1 (Y) 1 EPROJECT NO :F102F FALL 0.00 0.3988 : tanalyst :FU 0.20 : 0.3784 : tanalyst : 1 1 1 11.25 1.490 (FUCHALSKI 04-Jan-91 1 2 1 11.22 : 1.460 ; 0.80 1-0.2107 : IRISER FIPE (ID): 12 r sub c) = : 3: 10.57 0.810 : 2.0 in. = 0.0833 (radius in ft.) 1.20 :-0.3857 : REFFECTIVE SCREEN DIAMETER:(2 r sub w) = 8.0 in. = 10.44 1 0.680 ; 0.3333 (radius in ft.) 10.38 3 6.620 1 1.40 !-0.4780 : REFFECTIVE SCREEN LENGTH: (L) 9.00 Ft. 16.62 : 6.260 : 1.60 (-1.347) : #MAX DRAWBOWN (IN SUBSET): (Yeax) 2.46 Ft. 1.80 (-1.966) (SSTATIC WATER LEVEL) (SML) = 2.20 (-2.2073) SDEPTH FROM SML TO EFF. SCREEN ROTTOM: (H) = 9.90 0.140 (9.76 Ft. 58.46 Ft. : 8: 9.87 1 0.110 : 2.40 i-4.6052 : #EST. ABUIFER DEPTH (SNL TO ABUIFER BOTTOM): (D) = 175.00 Ft. 9.77 1 0.010 1 1 SINCLUDE SANDPACK DENATERING (ENTER 1 IF YES. 0 IF NO)? 1 10 1 : tSANDPACK'S SPECIFIC YIELD (Sv) = 1 12 1 1 13 1 BOUNER AND RICE CURVE COEFFICIENTS: 1 14 1 RATIO OF L/(r sub w) = 27.00 ---LOS DF L/(r sub w) = : 15 ! 1.4314 FOR PARTIALLY PENETRATINE WELLS--1 16 1 A = 2.33 8 = 1 18 1 0.32 1 19 1 FOR FULLY PENETRATINS WELLS--: 20 : £ ± 1.74 1 21 1 ---EVALUATION OF LN(Re/(r sub w)): 1 22 1 1 23 1 CONST.1 = 0.2129 1 24 1 CONST.2 = 5.8568 =(MAI, OF 6.0)= : 25 ; LNiRe/ir sub w) = 2.71 1 26 1 1 27 1 EFFECTIVE r sub : (for sandpack dewatering) = 0.0833 28 1 (1/T)(LN(Yo/Yt)) (SLOPE) = 29 ; : INYDRAULIC CONDUCTIVITY 1.28E-03 ft/ser : 30 1 (K) = (************** 1 31 1 3.91E-02 ca/sec 1 32 1 t=0-2.25 33 : Recression Output: Constant 6.85E-01 1 35 1 Std Err of Y Est 0.3651 1 36 1 A Squared 0.8865 1 37 1 No. of Observations Ē Degrees of Freedom . 25 ; 39 ; 1 40 1 I Coefficient(s) -1.23E+00 1 41 1 0.1795 1 42 1 1.43 (

BOUNER AND RICE METHOD FOR INTERFRETATION OF SLUE TESTS: FOR UNCONFINED AND LEAST CONFINED ADDIFERS.



SOURCE AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONTINED AND LEADY CONFINED AGUIFERS. TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN """. PROGRAM CAN INCLUDE EFFECTS OF SANDPACK DENATERING (ASSUMING NATER IS RISING NITHIN THE SANDPACK). 1 STIME maniabefin TO: DRAWDOWN STIME sec 1 EN - 1 SPROJECT NAME (f) WATER Ft." (f) 1 (X1) 1 (Y) 1 APROJECT NO 20026.024 ificze Rise . 436 6.00 -0.0726 , #PKAL/ST 6.63 :FUCHALSKI 0.20 1-0.1625 : \$PATE COLLECTED : 0.40 1-0.2877 : \$RISER FIFE :127: 04-Jac-51 0.950 ; 8.51 . (2 r sub c) = 5.01 0.750 1 1.0 in. = 0.0833 (radius in ft.) 0.60 1-0.4306 : REFFECTIVE SCREEN DIAMETER:(2 r sub w) = 5.0 in. = 0.3333 (radius in ft.) 0.650 : 9.11 : 9.22 (0.540 0.80 1-0.6162 : REFFECTIVE SCREEN LENGTH: (L) 9.00 Ft. 7.32 1 0.440 1 1.00 (-0.8210 : #MAX BRAWDOWN (IN SUBSET): (Ymax) 2.46 Ft. 1.20 :-1.1394 : SSTATIE WATER LEVEL: (SML) = 5 1.40 :-1.4271 : BEPTH FROM SML TO EFF. SCREEN BOTTOM: (H) = 7 ; 9.44 : 0.320 : 9.76 Ft. 9.52 1 : 8: 0.240 : 1.60 (-1.897) : MEST. ADUITER DEPTH (SML TO ADUITER BOTTOM): (D) = 9.150 : 175.00 Ft. 9.61 : 1.80 1-3.2189 : #INCLUDE SANDPACK DEWATERING (ENTER 1 19 YES, 0 IF NO?? 1.10% 9.72 : 0.040 : . #SANDPACK'S SPECIFIC YIELD (Sv) = 0.10 1 12 1 BOUNER AND RICE CURVE COEFFICIENTS: . 13 : RATIO OF L/(r sub w) = : 14 : 27.00 1 15 1 --- LOS DF L/ir sub wi = 1.4314 FOR PARTIALLY PENETRATING WELLS--: 16 : A = 1 18 1 B = 0.32 FOR FULLY PENETRATING HELLS-1 19 1 1.74 1 70 1 [* 1 21 1 --- EVALUATION OF LN(Re/(r sub w)): 1 22 1 CONST.1 = 0.2129 1 24 1 COMST.2 = =(MAX. OF 6.0)= 1 25 1 LN(Re/(r sub w) = 2.71 : 26 : EFFECTIVE r sub c (for sandpack dewatering) = 0.0833 : 27 : (1/T)(LM(Yo/Yt)) (SLOPE) = -1.10E+00 sec^(-1) : 28 : 1 29 1 : 30 : : : HYDRAULIC CONDUCTIVITY 1.15E-03 ft/sec : 31 : 3.50E-02 cm/sec t=0-1.65 1 32 1 1 33 ! Repression Output: 1.17E-01 1 35 1 Sto Err of 1 Est 0.1557 : 36 : R Squarec 0.9447 1 37 1 No. of Observations : 38 : Degrees of Freedom : I Coefficientis) -1.16E+00 1.41.1 Std Err of Coei. 0.1905 . 42 :

: 43 :



1'
TIME (SECONDS)

1.5

0.5

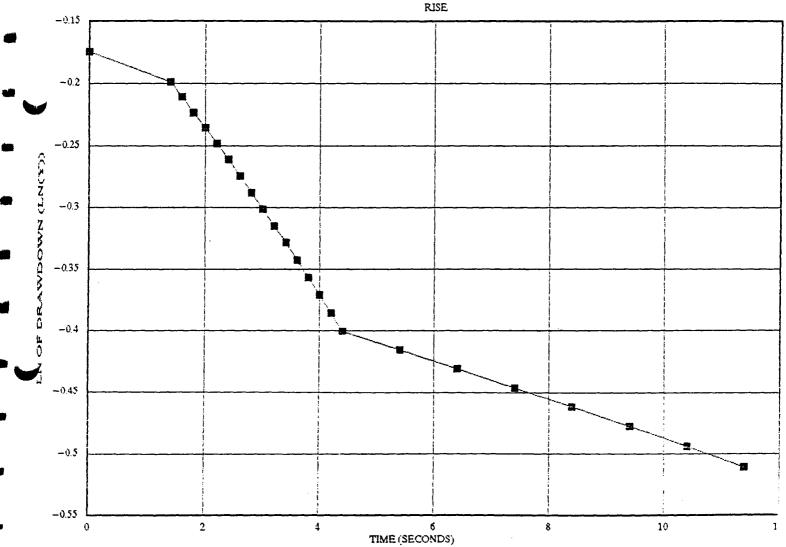
EGUNER AND SICE METHOL FOR INTERPRETATION OF GLUG ITESTS, FOR UNCOMFINED AND CONTINED ADJIFERS. TO UTILISE THIS WEST SECTOR OF SATE AT LOCATIONS MARKE BY TA "TO PROGRAM CAN INCLUDE EFFECTS OF SANDRACH DEWATERING HASAUTHR WATER IS RISING WITHIN THE SANDRACK).

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	19,47		ž.	÷.	3851.0-	TOWNE COLLECTED		(id-1380-0)			
•	10.48		. 918.	.0.1	1-6,2107	PAISE FIRE (B.)	2	(2 c sub c) =	2.0 in. 1		6.0833 (radius in ft.)
	67.91		906		: -6.2231	: REFFECTIVE SCHEEK PIGMETER: (2 r sub w) =	PLAMETERS	7 Sub N! #	8.0 m. a		6.3337 (radius in ft.)
	16.50		. 790	2.96		I REFECTIVE SCREEN LENGTH:		: ::	5.00 Ft.		
	16.51		.780	2.20		1 276, DRANDOWN (IN SUBSET): (Year)	SUBSET): ()	inax) =	0.23 Ft.		
	15.51		9.770	.46		TENET WITE LEVEL:		= (SNF) =	11.29 Ft.		
	10.2		7.00	2.60		1 195PTH FROM SEL TO EFF. SCREEN BOTTOM: (H)	EFF. SCREE	SOTTOR: (,,	149.40 Ft.	
	75 01		9	i		seet abuiters neeth (St. 10 Abuiter antion).	N 15% TO A	TIME BUTT	* (g)		175.00 Ft.
	10 G		240	ě		PARCHURE SANDRACY DEWETERING (ENTER 1 IF VES. (C. 1F NO)?	DENETERINE	ENTER 1 IF	YES. (. IF NO)?		0
	79.91		2.0			a (AS) G.BIV C.B.C.EQ. A. H.C.B.C.B.C.	15 VIED (S)		6.10		
	25 91		226.0	7							
	7					- Desert and over these Chestinishing	HERE PRESENT	TIENTS.			
· .	00.70		4	3 2		COUNTY THE SAME DESIGN OF THE	1 (1 4)		99 51		
	60.00		3 6			THE STATE OF THE S			27.5		
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91	16.0		689.	÷ 50		FOR PARTIELLY PENETRATING MELLO-	ENETERS IND	יייי			
17 :	10.62		0.670	₹.		# **		1.93			
	10.63		: 099.0	5.40	•			0.29			
16:	10.64		. 029.0	6.40	1-6.4308 ;	: FOR FULLY PENETRATING WELLS	RATINS NELL!	ሐ			
20 :	10.65		.640	7.40	1-0.4463 1			1.38			
71 7	10.66		.630	9	1-9,4620 ;						
	10.67		0.620	04.6	1-0.47B0	:EVALUETION OF LM(Re/'r sub w)):	OF LM(Re/4)	r sub #1);			
	10.68		1 019.0	10.40		: CDNST.1 =		0.1802			
	10.69		. 009.	11.40		CONST.2 *		4.5412	=(MAX. OF 6.0)=		4.3412
 				:		IN(FP/C cub m)	and in		2.54		

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- 12									3.272-03 68/556	 Ľ	7,117
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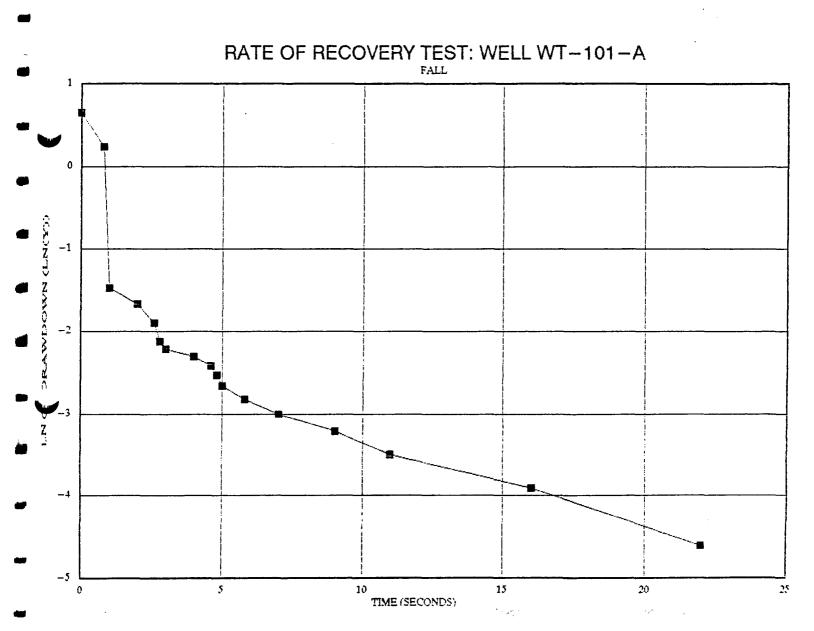




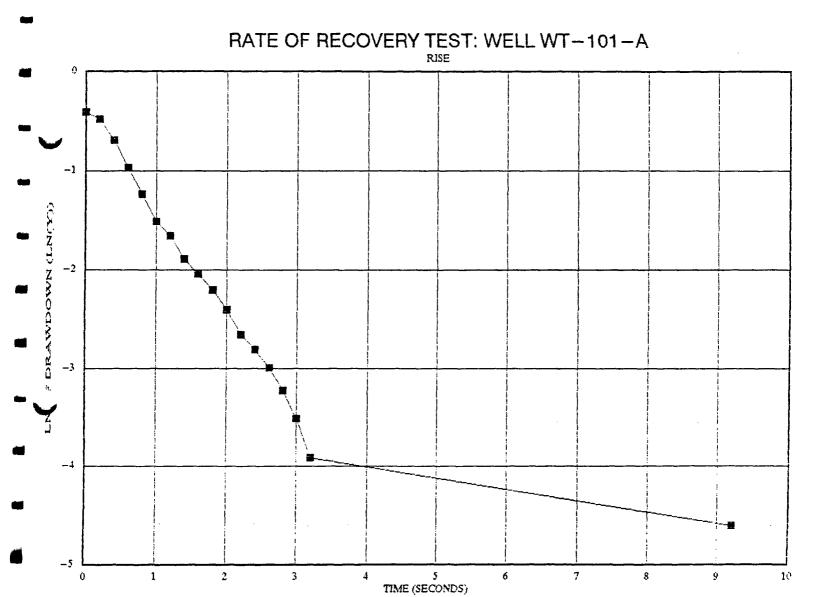
EGUNER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY CONFINED ADUIFERS. TO UTILIZE THIS WORKSHEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN "1". PROGRAM CAN INCLUDE EFFECTS OF SANDRACK DEMATERING (ASSUMING WATER IS FISING WITHIN THE SANDRACK). INTIME BININDETTH TO: BRANDONN INTME SEC : LN : I APROJECT NAME: (I) : IMPER PEL: (I) : (I :+0#10 20026.024 :#7-1014 FALL : 13 6.95 ; 1.530 1 0.00 (0.6575) BANALYST :EL IAS 0.80 : 0.2469 : \$DATE COLLECTED :12-1-90 : 2 ; e.30 : 1.280 : 7.25 ; 1.00 :-1.4697 ; #RISER PIPE :ID:: (2 r sub c) = 2.0 in. = 0.0853 (radius in fi.) : 3: 0.230 1 2.00 1-1.6607 | SEFFECTIVE SCREEN DIAMETER: (2 r sub w) = 7.21 : 0.190 1 6.0 in. = 0.3333 (radius in ft.) 2.60 :-1.8971 : SEFFECTIVE SCREEN LENGTH: (L) 7.44 Ft. : 5; 7.17 : 0.150 ; -1.90 Ft. 7.14 : 0.120 1 2.80 :-2.1203 : #MAX DRAWDOWN (IN SUBSET): (Year) 7.13 : 0.110 : 3.00 1-2.2073 : #5TATIC WATER LEVEL: (SWL) 4.00 :-2.3026 : BDEPTH FROM SWL TO EFF. SCREEN BOTTOM: (M) = 4.60 :-2.4079 : BEST. AGUISES DEPTH (SWL TO AGUISES BOTTOM): (D) = 1 6 : 7.12 1 6.100 : 175.00 Ft. 0.090 1 9 : 7.11 1 4.86 1-2.5257 1 SINCLUDE SANDPACK DEMATERING CENTER 1 IF YES. 0 IF NO!? 3 16 1 6.680 1 7.16 : 5.00 (-1.6593 : #SANDPAD) & SPECIFIC YIELD (SV) = 1 11 1 7.09 ; 6.070 ! 0.10 7.08 : 0.060 1 5.60 1-2.8134 1 13 1 7.07 : 0.050 (7.00 1-2.9957 1 BOUNER AND RICE CURVE COEFFICIENTS: 1 14 1 7.06 : 0.040 : 9.00 (-3.2189) RATIO OF L/(r sub w) = 22.32 0.030 1 11.00 1-3.5046 1 --- LDS DF L/(r sub w) 1 15 1 7.05 1 1.3467 16.00 1-3.9120 1 FOR PARTIALLY PENETRATING WELLS--7.04 1 0.020 ; : 16 : 1 17 1 7.03 : 0.010 : 22.00 (-4.6052) 2.17 £ = 1 18 1 0.31 1 17 1 FOR FULLY PENETRATING WELLS--1 20 1 €.= 1.59 7.020 : : 21 1 --- EVALUATION OF LN(Re/(r sub w)): 1 22 1 7.020 1 1 23 1 CONST.1 = 0.3379 CONST.2 = 6.2128 =(MAX. OF 6.0)= 1 24 1 1.93 1 26 1 EFFECTIVE r sub c (for sandpack dewatering) = 0.1318 1 27 1 1 (1/T)(LN(Yo/Yt)) (SUDPF) = -1.3RF-01 sec^(-11 1 28 1 1 29 1 : 30 : : INVERABLIC CONDUCTIVITY (K) = 3.10E-04 ft/sec 1 31 1 9.45E-03 cm/sec 3 32 8 4=2.-225 1 33 1 Repression Output: 1 34 1 Constant -1.80E+00 1 35 1 0.2057 Std Err of Y Est 1 36 1 R Squared 0.9411 1 37 1 No. of Observations 14 : 38 : Degrees of Freedom 12 1 39 1 1 40 1 1 X Coefficient(s) -1.38E-01 1.41.1 Std Err e- Loef. 1 42 1

BOUWER AND FICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAVY CONFINED ADUIFERS. TO UTILIZE THIS WORLSHEET, ENTER YOUR DATA HE LOCATIONS MARKED BY AN IT.

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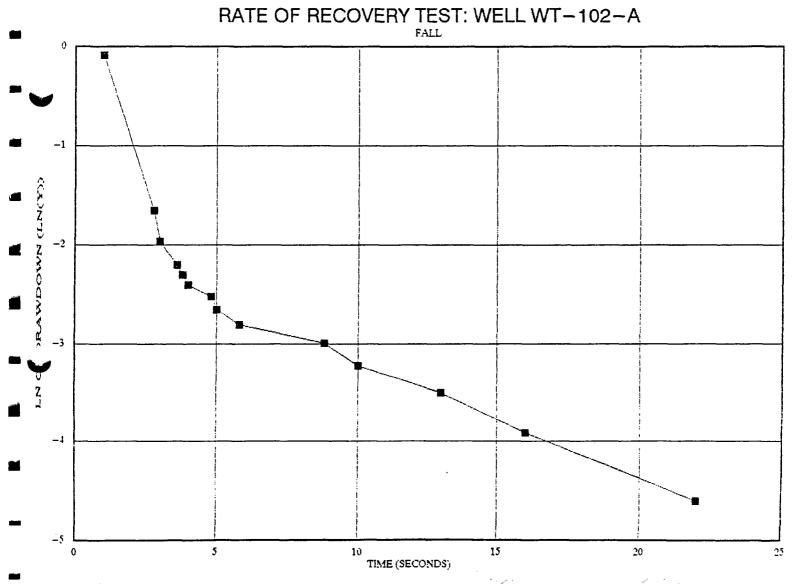


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		()						i at		
1		6.35	0.670			: #ANALYST :E! : #DATE COLLECTED :11				
2		5.40	0.520 0.500						2	0.0833 (radius in f
3	•	6.50	6.300 6.380	1 0.40	1-0.6731	: #RISER FIFE (ID): : #EFFECTIVE SCREEN BIAN	la.	7 500 () =	2.0 18. =	0.0000 tradius in f
5	•	6.64 /	0.290			. BEFFECTIVE SCREEN LEN				0.0000 1789205 IN T
Ь	•	1 4.80 1	0.270			: SMAX DRAWDOWN (IN SUBS	,			
7	•	6.83 :	0.190			STATIC WATER LEVEL:			7.02 Ft.	
ş	•	i 6.87 ;	0.150			DEPTH FROM SAL TO EFF				44 24.
5	•	1 4.29 1	0.136			MEST. ASUIFER SEPTH (S				
10		6.71	6.119			DENCLUSE BANDSACK DEW				
11		0.53	6.695			ASAMORACK'S SPECIFIC				`
12		6.95	0.070							
13		6.96	0.060			BOUNER AND RICE CURVE				
14		6.97	6.050	_		RA710 OF L/17 Sub a			22.32	
15		6.98	0.040			LGG OF L/(; su			1.3487	
16		4.99	0.030			FOR PARTIALLY PENET				
17		7.00	0.020		1-3.9120			2.17		
18	-	7.01	0.010	9.20	1-4.6052	B =		0.31		
15	1	7.02			ERR	FOR FULLY PENETRAT	NG WELLS			
20	1	1		;		£ =		1.57		
21	1	1 :		;	;					
22	:	: :		:	:	EVALUATION OF	LNike/ir	Sub #1):		
23	:	1 1		1	:	CON57.1 =		0.3379		
24	ł	t :		ì	;	CONST.2 =		6.2128	=(MAI. OF 6.0)=	6.0000
25	:	1 1		;	1	LN(Re/Ir sub	: w) =		1.93	
26	:	1 1		:	1 :					
27	;	1 1		:	1	EFFECTIVE r sub c (for sand	Dack dewate	ering) = 0.08	133
28	;	1 1		;		(1/T){LN(Yo/Yt)} (-9.77E-01 sec^i-1	
29		; ;		;	•	{				•
30	•	1 :		;	1	HYDRAULIC CONDUCTIVIT	Y ik) =		
31	•	1 1		ł .	1	;			2.69E-02 cm/sec	
32		1 1		i	1					: t=1-35
33	•	1 1		1	;		oression	Output:		
34		3		;	}	Constant Std Err of Y Est			-4.94E-	**
35		1 1		1	: :	Std Err of Y Est			0.04	
36		1				R Souared			0.99	
37		1				No. of Observations				11
38					: :	Degrees of Freedom				9
39	•			i						
10	-			i		I Coefficient(s) Std Err of Coef.			-9.77E-01 0.0202	
1 3										



POUNER AND RICE METHOU FOR INTERFRETATION OF SLUG TESTS: FOR UNCONFINED AND LEARY CONFINED AGUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "1".
FROGRAM CAM INCLUDE EFFECTS OF SANDPACK DEMATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

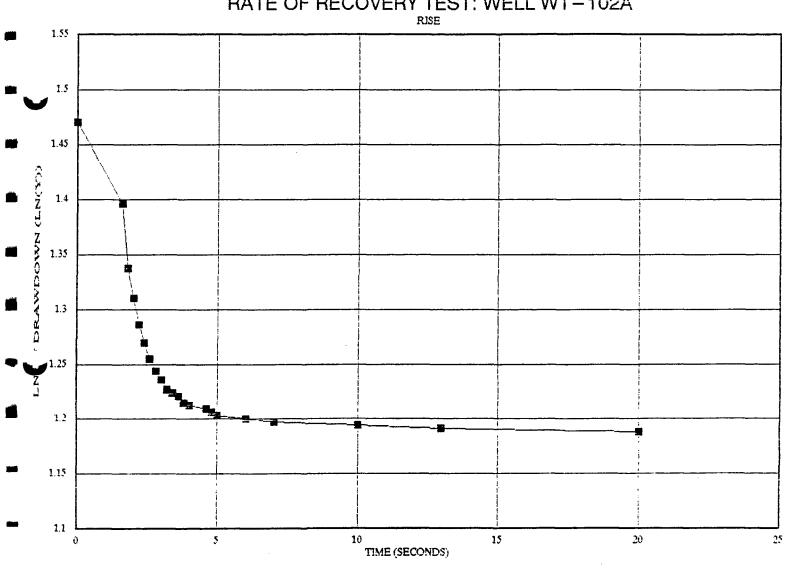
	===		********		*********	######################################
i	;1	TIME ain: SDEPTH TO:	BRUMBOMM	111HE 585	1 (2)	: #PRDJECT NAME : : : : : : : : : : : : : : : : : : :
		(1) IMMIER FEEL	11)	:	! !!!	: #PROJECT NO : 20026.024 : #MELL NO :NT-102A FALL
	i	7,02		. 6.00	: ERR	: TANALYST :ELIAS
: i	i					DATE DOLLECTED :12-1-90
. 3	ì	1 7.21 ;				: #RISER PIPE (10): (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
: 4	1	7.16				teffective screen biameter:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
: 5	;	1 7.1° i	6.110			: REFFECTIVE SCREEN LENGTH: (L) = 10.29 Ft.
-		7.11 (3.80	1-2.3026	taman brawnown (IN BUBSET') (year) = -0.01 Ft.
7	-					, #STATIC WATER LEVEL: (SWL) = 7.00 Ft.
. 5						: #DEFTH FROM Sk. TO EFF. SCREEN BOTTOM: (H) = 10.25 Ft.
=	•					: MEST, AGUSTER BETTH (BKL TO AGUSTER SOTTOM): (B) = 175,00 Ft.
16						FAINCLUBE SANDACK DEWATERING FENTER 1 IF YES. C IF NO.P 1
1 11	-	1.07	0.050	8.80	1-2.9957	SANDPACN'S SPECIFIC YIELD (SV) = 0.10
. 12		7.65 : 2 7.05 :	0.040			
1 13		7.04	0.030			: BOUNER AND FICE CURVE COEFFICIENTS: : 30.87
: 15				1 22 00	1-3.7120	
: 16		1 7.03 1	7.020	! 22.00	1-4.0032	
: 17			7.020		i	A = 2.47
: 18		ii	7.020			B = 0.34
1 19			7.020		:	B = 0.34 FOR FULLY PENETRATING WELLS
20	:	1 1	7.020	i	: :	£ = 1.86
1 21	;	: :	7.020	1	1 1	!
22	ŀ	: 1		;	;	EVALUATION OF EN(Re/(r sub wi):
: 23		: :		l	;	CONST.1 = 0.3207 CONST.2 = 6.2028 =(MAX. OF 6.0) = 6.0000
: 24		:		;	1 1	
25		1 1			1 1	LN(Re/(r sub w) = 2.14
26					:	***************************************
27				i		EFFECTIVE r sub c (for sandback dewatering) = 0.1318
28				i I	, ,	(1/T)(LN(Yo/Yt)) (\$LOFE) = -1.23E-01 sec^(-1)
30		, ,				:HYDRAULIC COMBUCTIVITY (K) = 2.23E-64 ft/sec : (***********************************
: 31		; ;				6.80E-03 co/sec (************************************
: 32					:	
33		ii			i i	Repression Output:
34						Fonetant -1 975+00
: 35	:	1 1	!		; ;	Std Err of Y Est 0.0966
36	:	1 1			, ,	R Squared 0.9849
37	:	: :			: :	No. of Observations 11
: 28	ļ	1 1	1		:	Degrees of Freedom 9
: 39	1	1 1	:		:	:
40		1 1	:			I Coefficient(s) -1.23E-01
41 1						Std Err of Coef. 0.0051
42			i			
43 :	;	; ;	:		;	+



EDUNER AND RICE METHOD FOR INTERPRETATION OF SLUE TESTS: FOR UNCONFINED AND LEAKY CONFINED ABUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "1".
PROBLEM CAN INCLUDE EFFECTS OF SANDFACK DEWATERING HASSIMING WATER IS RISING AITHIN THE SANDFACK).

====						
:	: \$	TIME min! DEPTH TO:	DRAWDOWN	TIME Sec	LN	APROJECT NAME :HIMCD :
18	i	(R) IMPLEM FE.:	(4)		. 171	: APROJECT NO : Z0026-024 *** THELL NO :NT-10CP RISE
1	-,-	5.94	4 356	0.06	: 4702	I ANALYST IELIAS
´ :			1.040	1 4 26 1	1 7247	* *DATE PRINCIPED
	:	£.49 1	1.510	1.90	1.5376	: ###SEE PIPE (191)
. 4	i	2.56	7.710	1.60	1.3116	(REFFECTIVE SCREEN DIAMETER:12 r sub w) = 8.0 in. = 0.3333 tradius in ft.)
. 5	í	1 6.67 1				: MEFFECTIVE SCREEN LENGTH: (L) = 11.09 Ft.
: 6	1			2.40	1.2698	: smax DRANDDWN (IN SUBSET); (Ymax) = 4.04 Ft.
. 7	;	1 6.76 1	3.510	1 2.60	1.2556	: #STATIC WATER LEVEL: (SWL) = 10.29 Ft.
: 8	;) 6.82 h	3.470	1 1.86 1	1.2442	: #DEPTH FROM SNL TO EFF. SCREEN BOTTOM: (H) = 9.53 Ft.
; 9	;	1 6.85 1	3.440			: BEST. ADUJFER DEPTH (SNL TO ADUJFER BOTTOM): (D) = 12.33 Ft.
: 10	;	: 6.89 :	3.410	3.20	1.2267	## ## ## ## ## ## ## ## ## ## ## ## ##
: 11		1 6.89 1		3.40	1.2238	1 15AMDFACK'S SPECIFIC YIELD (Sy) = 0.10
12		i 6.70 i				,
1 13		6.92				DOUNER AND RICE CURVE COEFFICIENTS:
1 14		1 6.73		4,06	1.7119	RATIO OF 1/4r sub w: = 33.27
: 15		1 6.94 1				i06 DF L/(r sub w) = 1.5221
16		1 6.95 1				FOR PARTIALLY PENETRATING WELLS-
: 17 : 18		6.96		1 2.00	1.2000	A = 2.55 B = 0.35
1 19		1 6.98				FOR FULLY PENETRATING WELLS
20		1 6.99 1		10.00		
: 21		1 7.00		13.00 :		
22						EVALUATION OF LN(Re/(r sub w));
23		1		1 1		CONST.1 = 0.3281
24	;	1 1		: :		CONST.1 \$ 0.3281 CONST.2 \$ 2.1282 =(MAX. OF 6.0)= 2.1282
25	;	: :		: ;		1 1125-77- aut 3 - 5 7 2
: 26	:	1 1		: :		EFFECTIVE r sub c (for sandpack dewatering) = 0.1318 (1/T)(LN(Yo/Yt)) (SLOPE) = -7.41E-02 sec^(-1)
: 27	;	: :		: :		EFFECTIVE r sub c (for sandpack dewatering) = 0.1318
: 28	:	1 1		; ;		(1/T)(LN(Yo/Yt)) (SLOPE) = -7.41E-02 sec^(-1) ;
: 29	ŧ	1 1		: :		
: 30		;		: :		HYDRAULIC CONDUCTIVITY (K) = 1.36E-04 ft/sec : (***********************************
1 31		1 1		1 1		4.14E-03 cm/sec { (***********************************
32		1 1		; ;	;	1
33		1 1				
34			!	1		Constant 1.45E+00 : Std Err of Y Est 0.0056 :
35				i !		Std Err of Y Est 0.0056
36		; ;		: 1		K Souered 0.9686
: 38		1 1	i	· ·		No. of Observations 6 . : Decrees of Freedom 4
39				;	,	NEWIFEL OF FREEDOM 5
40			,	:	,	1 Coefficient(s) -7.41E-02
41		; ;				Std Err of Coef. 0.0067
42		; ;			:	4.000/ 4.000/ 1.000 Vision Vis
43		; ;	,	3		!
43	1	i i	i	i	i	

RATE OF RECOVERY TEST: WELL WT-102A



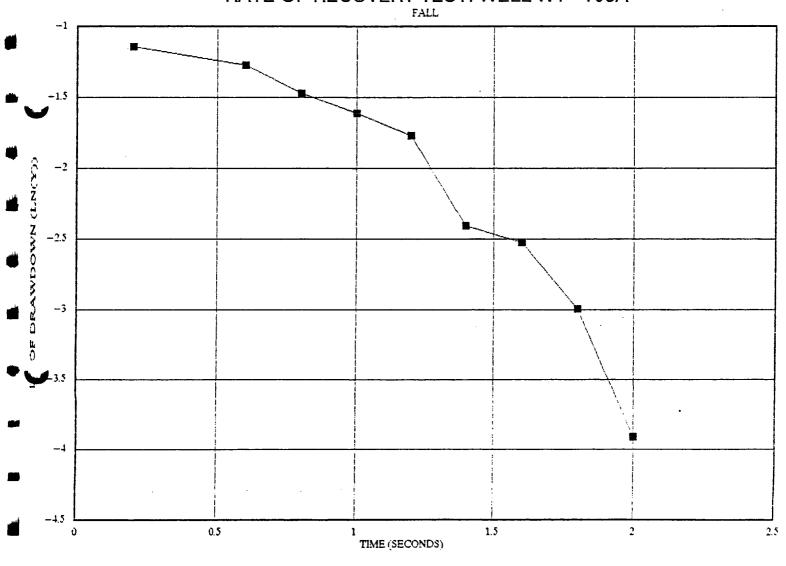
FOUNER AND RICE METHOD FOR INTERSPRETATION OF SLUG TESTS; FOR UNCONFINED AND LEAKY COMFINED ADUIFERS.

TO UTILIZE THIS NORMENEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN ***.

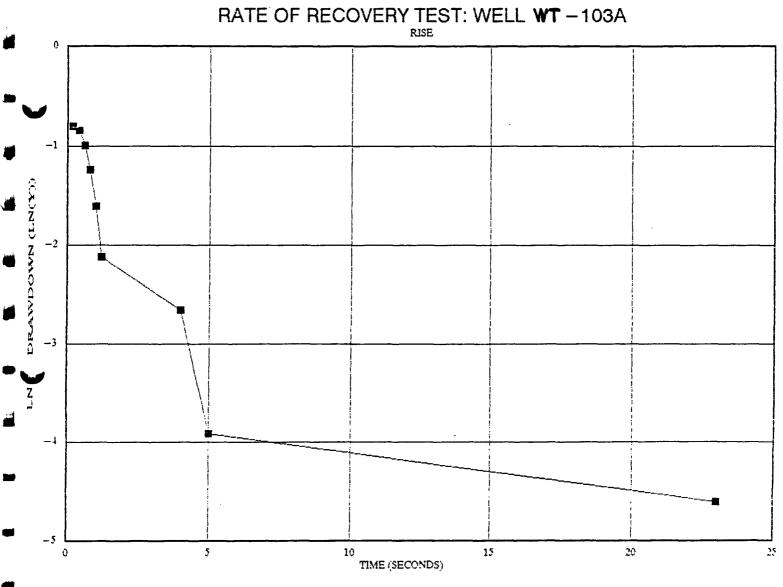
PROGRAM CAN INCLUDE EFFECTS OF SANDRACK DENATERING (ASSUMING WATER IS RISING WITHIN THE SANDRACK).

:							1 AFFOJECT HAME :HIMCE
							: 1FRDJECT MD : 20026.024
	!	;				!	I BNELL NO :NT-103A FALL
			7.95				: BANALYST :ELIAS
			3.30				: 1D4TE COLLECTED ::12-14-90
			5.20	v.290	9.60	1-1.1736	. #RISER PIPE (1875 — (2 m sub c) = — 2.0 m, = — (.0873 (radius in ft.) : #EFFECTIVE SCREEN DIAMETER:(3 m sub w) = — 8.0 in. = — (.3333 (radius in ft.)
	٠.		8.21				
	5 :		£.16				. REFFECTIVE SCREEN LENGTH: (L = 6.45 Ft.
	ė		8.15				: BMAX DRAWDOWN (IN SUBSET): (Ymax) = -6.30 Ft.
-	7 :	•	5.67				: #STATIC WATER LEVEL: (SWL) = 7.98 Ft.
	e :		9.06				: #DEPTH FROM SN. TO EFF. SCREEN BOTTOM: (H) = 6.46 Ft.
	9 :	· ·	8.03				: BEST. AGUIFER DEPTH (SWL TO AGUIFER BOTTOM): (D) = 12.33 Ft.
-	6 !		8.00				: #INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 6 IF NO)?
	1 :		7.98 :				: #SAMBPACK'S SPECIFIC YIELD (Sy) = 0.10
-	2		:				
-	3 }		;	'	1	1	BOUNER AND RICE CURVE COEFFICIENTS:
-	4 }	•	1		:	1	RATIC OF L/(r sub w) = 15.38
	5 :		;		:		LDB OF L/(r sub w) = 1.2874
	ė i	;	:		;		FOR PARTIALLY PENETRATING WELLS
-	7 ;	ï	;	1	1	:	1 A = 2.07
-	θ;	:	;		;		: F = 0.30
	9 ;	;	;	;		1	FOR FULLY PENETRATING WELLS
	į į	;	;	1	1	1	C = 1,50
	: :	:	;	;	}	;	
-	2 }	}	;	1	1	1	EVALUATION OF LN(Re/ir sub w)):
2.	3 1	:	1	1	;	}	CONST.1 = 0.3711
_	1	:	1	:	}	:	CONST.2 = 2.8685 *(MAI. OF 6.0)= 2.8685
25	5 :	:	:	1	}	;	LN(Re/(r sub w) = 1.92
26	. !	:	:		1	:	
27	7 }	ľ	ţ	1	ì		EFFECTIVE r sub c (for sandoack dewatering) = 0.0833
28	} ;	:	;	1		1 :	(1/T)(LN(Yo/Yt)) (SLOPE) = -5.92E-01 sec^(-1)
	7 :	:	;	;	1		
30) ;	1	;	;		; ;	HYDRAULIC COMDUCTIVITY (K) = 6.10E-04 ft/sec ; (=============
31	1	;	ł	:		: :	1.66E-02 ca/sec (***********************************
32	? ;	:	;	:		: ;	t=0.2-15
	; ;	;	;	;		; ;	Repression Output:
34	1	:	;	}		: :	Constant -9.89E-01
35	1	;	:	;		: :	Std Err of Y Est 0.0590
36		!	1	}			9. Souared 0.9464
37		;	i	;			No. of Observations 4
38	1	ł	í	;		; ;	Degrees of Freedom 2
39	;	;	;	:		; ;	
40	1	1	:	;		;	X Coefficientis) -5.92E-01
41	;	1	;	i		:	Std Err of Coef. 0.0997
42	:	1	;	:	1	;	
43	:	:	:	:		: :	

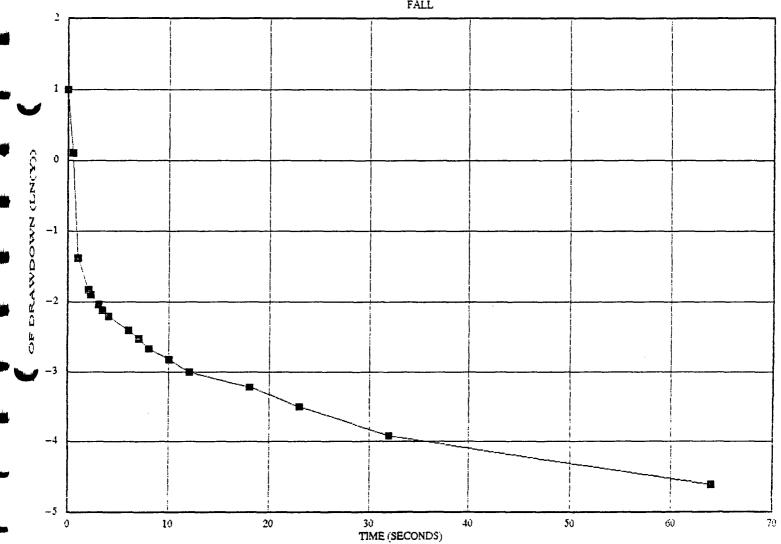
RATE OF RECOVERY TEST: WELL WT-103A



		•	Begrees of Freedom					
		3.	No. of Observations					
	0.9045		R Squared					
	0.1756		Std Err of Y Est					
	-3.53F-(ii	Repression Dutput:	Constant					
52.1-2.4								
****************	4.10E-02 cm/sec							
, (2::::::::::::::::::::::::::::::::::::	1,35E-03 ft/sec	* (X) ALIAI	I HANDRUMFIC CONDUCTIVITY			 -		
!_	71-3 396 304210-1-) (SLUTE) *	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	 -				
	iewatering) = 0.0833		EFFECTIVE r sub			· •• •		
***************************************	1.76	100 m	(S(X8/(7 NGO 8)	 -				
1.0003	1 1 1 H	2.8683	CD#51.2 =					
200			CONS1.1 =					
	3);	SF LHIRE/IT SI	ENALUATION					
	1.38							
	\$		THE PULLY PERSONNIAND MELLS-	·				
	U.30							
	2.07		* 35					
		NETRATING WELLS-	FOR PARTIALLY F					
	1.2674	r sub w) =	;106 0F L/ir sub w) =					
	19.38	UE #3 #	T RATIO OF LIFE sub-ell-e					
		DAVE COEFFICIENTS:	FOURTH AND RICE CHAVE COEFFICIENTS:					
	V.10	TE 1255 (34) *	STATE OF STA					
•	SINCLUSE SANSPACE SCHAIRKING (SHIER) IT YEV. O IT NO!	SCHALLKING (ENIER	TINCLUDE SANSPACE	:-4.6052	23.00	6.010 :	7.98:	
12.33 Ft.	BOTTOM: (D) =	H (SWL TO ABUIFER	: REST. ABUIFER DEFTH (SWL TO ABUIFER BUTTOM):	:-5.9120	5.00	0.020 :	7.97 :	
		EFF. SCREEN WOTTO	: IDEFTH FROM SWL TO EFF. SCREEN BOTTOM: (H)	?-2.6593	4.00	0.070 :	7.96	
	7.96 Ft.	E: (SkL)	I STATIC WATER LEVELS	1-2.1263	1.20	ė.120 :	: 7.91 :	
	a 6.32 Ft.	SUPSETION (YEAR)	THAT DEANDONN (IN SUBSETIE	1-1.5084	1.00	0.290	7.8.	
	* 6.46 Ft.		I REFFECTIVE SCREEN LENGTHS	-1.2379	€.90	0.290	7.78	
0.3332 (radius in ft.)		DIAMETER: () r sub	. MELLECTIAN RESERVE BINNELEGATE LA PRINCIPAL MELLECTURE CONTRACTOR CONTRACTO	-6.4943		6.776	7.59	
G. (BIS (radies in it.)		(2 r sub c) s	PIER FIFE (TO)	1-0-5440	9.46	0.430 :	7.61	
		: December 14, 1990	. IDATE COLLECTED	7925	5.20	0.450	7.55	
	:	if life	BANKE 151	2.5769	6.06	7.990 (7.55	
		M1-1624 EISM	一番にお		-			•
	024	: 20024.024	1 RPROJECT NO		í.	3	WATER Ft.	2
		:HINCO	: TATTIME WINTEDEPTH TO: DRAWDOWN TITME SEC : LN . IPROJECT WAME SHIMCO	5	345 3HE	PRANDONS STIME SEC :	:TIME ain:sDEPTH TO:	Time ain



RATE OF RECOVERY TEST: WELL **WT**-104A



STITUTE BENTEREFOR TO: DRAWDOWN STIME SEC 1 LN . : SPROJECT NAME :H1MCD 1 (x) IMATER Ft.: 'Y) | IX'Y | (Y) | #PROJECT NO 20026.024 INT-104A RISE 6.02 1 0.010 (0.00 1-4.6052 : #ANALYST :ELIAS 2.00 :-0.1863 : #LATE COLLECTED :12-14-90 2.60 :-0.3567 : #RISER PIPE (ID): (2 r sub c) = 2.89 :-0.5821 : #EFFECTIVE SCREEN DIAMETER:(2 r sub w) = 5.18 : 0.830 : 3 : 5.31 : 0.700 1 2.0 in. = 0.0833 (radius in ft.) 5.44 : 0.570 : 8.0 in. = 0.3333 (radius in ft.) 3.00 1-0.7765 : REFFECTIVE SCREEN LENGTH: (L)
3.20 1-1.0217 : RMAX DRANDONN (IN SUBSET): (Yeax) 5.55 : 5 : 0.440 : 12.67 Ft. 5.65 : 0.360 : 0.70 Ft. 0.290 1 3.40 1-1.2379 : #STATIC WATER LEVEL: (SWL) 6.01 Ft. 3.80 (-1.427) : **EFFIN FROM SML TO EFF. SCREEN BOTTON: (H) = 12.67 Ft. 3.80 (-1.427) : **EST. AGUIFER BEFTH (SML TO AGUIFER BOTTON): (D) = 1.4.00 (-1.6094 : **INCLUDE SAMPPACH DENATERING (ENTER 1 IF YES, 0 IF NO)? 4.20 (-1.7720 : **SAMPACH S SPECIFIC VIEW (GA) = 1.4.00 (-1.4.000) 5.73 : 0.280 : 9 : 5.77 : 0.240 : 175.00 Ft. 1 10 1 5.61 : 6.200 1 : 11 : 5.84 0.170 : 1 12 1 5.86 : 6.150 1 4.40 :-1.8971 :-----: 13 : 5.87 : 0.140 : 4.60 1-1.9661 1 BOUNER AND RICE CURVE COEFFICIENTS: 1 14 1 5.88 : 0.130 : 4.80 1-2.0402 1 RATIO OF L/(r sub w) = : 15 : 5.90 : 0.110 : 5.00 1-2.2073 1 ---LOG OF L/(r sub w) = 1.5799 5.60 1-2.3026 1 5.91 : FOR PARTIALLY PENETRATING WELLS-1 16 1 0.100 1 0.090 : 5.80 1-2.4079 1 : 17 : 5.92 : A = 2.71 6.00 1-2.5257 1 5.93 : 0.090 : 0.37 : 19 : 5.94 : 0.070 : 7.00 1-2.6593 1 FOR FULLY PENETRATING WELLS--: 20 i 5.95 : 0.060 : 7.80 (-2.8134) £ = 1 21 1 5.96 : 0.050 : B.00 1-2.9957 1 11.00 1-3.2189 1 ---EVALUATION OF LN(Re/(r sub w)); 5.97 1 : 22 : 0.040 | ; 23 : 0.030 : 12.00 1-3.5066 5.98 CONST.1 = 0.3024 15.00 1-3.9120 1 CONST.2 = : 24 ; 5.99 1 0.020 : 6.1882 =(MAX. OF 6.0)= 6.0000 25 1 0.010 : 25.00 1-4.6052 1 LN(Re/(r sub w) = 2.31 1 26 1 6.01 : 0.000 : 39.00 1 ERR 1 EFFECTIVE r sub c (for sandback dewatering) = 1 27 1 0.1318 1 28 1 (1/T)(LN(YO/Yt)) (SLOPE) = -8.04E-01 sec^(-1) 1 29 1 : 30 : : :HYDRAULIC CONDUCTIVITY (K) = 1.28E-03 ft/sec

Constant

A Squared

Std Err of Y Est

1 Degrees of Freedom

Std Err of Coef.

: 1 Coefficient(s)

No. of Observations

3.89E-02 cm/sec

-B.06E-01

0.0355

1.64E+00

0.0748

0.9827

Recression Output:

t=2,6-4.65

BOUWER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY CONFINED ADUIFERS.

PROGRAM CAN INCLUDE EFFECTS OF SANSPACY DENATERING (ASSUMING WATER IS RISING NITHIN THE SANDPACK).

TO UTILIZE THIS WORKSHEET. ENTER YOUR DATA AT LOCATIONS MARKED BY AN ***

: 31 1

1 32 1

: 33 :

1 34 1

: 35 ;

1 36 1

1 37 1

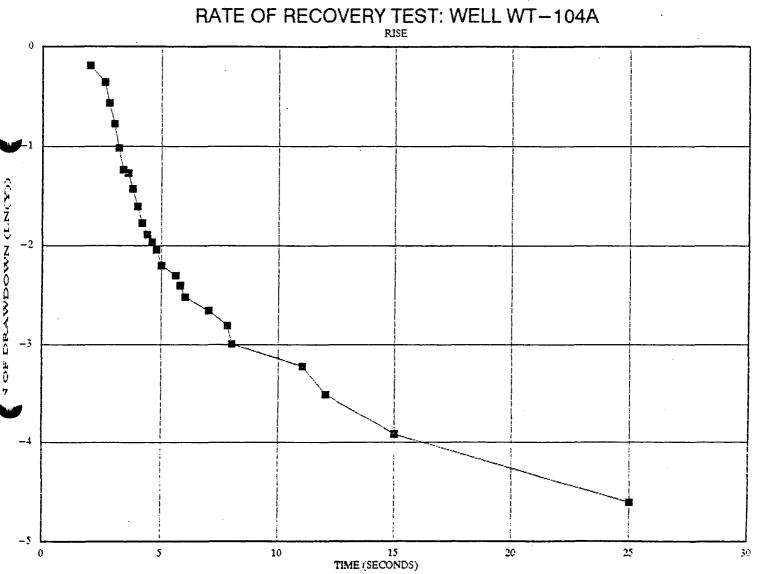
: 38 :

1 39 1

1 40 1

: 41 :

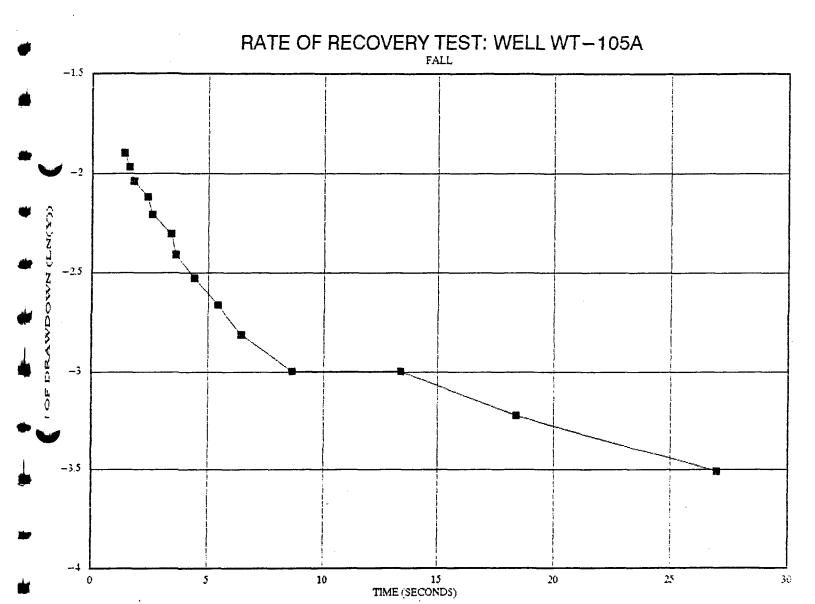
1 42 1



ADDNER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCOMPINED AND LEARY CONFINED ADDIFERS. TO UTILIZE THIS WORMSHEET. ENTER YOUR DATA AT LOCATIONS MARKED &. AN "1". PROGRAM CAN INCLUDE EFFECTS OF SANDRACY DEWATERING HASSUMING WATER IS RISING WITHIN THE SANDRACK). 1871ME BAINISDEFTH TO: DRAWDOWN 171ME SEC : LN ... SERCIECT NAME : (X) : (NATER FE.: (Y) : 1 - 47 - (Y) : #FROZECT NG :::1810 20026.024 -----: TWELL NG :67-105A FALL . 1 : 9.96 : 1.980 : 0.00 | 0.6831 | MANALYST :ELIAS 9.42 1 1.440 : 0.20 : 0.3646 : #DATE COLLECTED ::2-14-90 1.40 (-1.8971) RRISER PIPE (10): (2 r sub c) = 1.60 (-1.956) | REFECTIVE SCREEN DIAMETER:(2 r sub m) = 8.13 1 9.150 : 2.0 in. = 0.0533 (radius in ft.) 8.12 6.145 1 8.0 in. = 6.3333 (radius in ft.) 1.80 .-2.0402 . REFFECTIVE SCREEN LENSTH: (L) 5 : 9.130 1 10.08 Ft. 8.11 : 8.10 0.120 (1.40 1-1.1260 : MAS DEAMDONS (IN SUBSETION CYMAS) -0.13 Ft. c : 1.66 (-1.1072 | REPOTOE NATES LEVEL) | (SML) = 7.96 Ft. 1.40 (-1.1072 | REPOTOE NATES LEVEL) | (SML) = 7.96 Ft. 1.40 (-1.1076) ROBERT FROM SM. TO EFF. SCREEN BOTTOM: (H) = 1.60 (-1.4075) REST. AGUIFER DEPTH (SML TO ADUIFER BOTTOM: (D) = 4.40 (-2.5257) RINGLUDE SAMBFACU DEMATERING (ENTER 1 IF YES. 0 IF NO)? 5.00 8.08 0.100 n 10.08 Ft. 8.07 5.090 . 175.00 Ft. 10 1 0.080 : 3.04 : 5.40 1-2.6597 1 SEANDPACK'S BESCHELD YIELD (SV) = 0.976 1 0.10 1 11 : B.05 : 8.64 1 0.060 } 6.40 1-2.6134 1-----: 12 : : 13 : 8.03 : 0.050 : 5.60 (-2.9957) SOUNER AND RICE CURVE COEFFICIENTS: 1 14 1 8.02 : 0.046 1 13.40 1-2.9957 1 RATIO OF L/(r sub w) = 30.24 1 15 1 8.01 : 0.030 1 18.40 (-3.2189) ---LOS OF L/(r sub #) = 27.00 1-3.5066 1 1 16 1 6.00 : 0.020 : FOR FARTIALLY PENETRATING WELLS--: 17 : 2.45 4 = F = 0.34 : 16 : FOR FULLY PENETRATING WELLS--: 20 ; £ = : 21 | ---EVALUATION OF INTRE/IT sub w)): : 22 : 1 23 1 COMST.1 = 0.3227 1 24 1 CONST.2 = 6.2041 =(MAI. OF 6.0)= : 25 ; 2.13 1 26 1 EFFECTIVE r sub c (for sandpack dewatering) = 0.1318 1 27 1 (1/T)(LW(Yo/Yt)) (SLBPE) = -1.81E-01 sec^(-1) : 28 : 3.32E-04 ft/sec : THYBRAULIE CONDUCTIVITY 1 30 1 ()() = /**************** 1.01E-02 cm/sec (************ 1 32 1 t= 2.6 - 4.4 5 : 33 ! Repression Output: -1.735+00 Constant 35 ! Std Err of ' Est 0.0357 R Bouared 6,9549 Ac. of Observations 32 : Depress of Freedom 40 1. + icefficient's: 41 : : Sto Err of Cook. 9.0279

•

42 43 ;

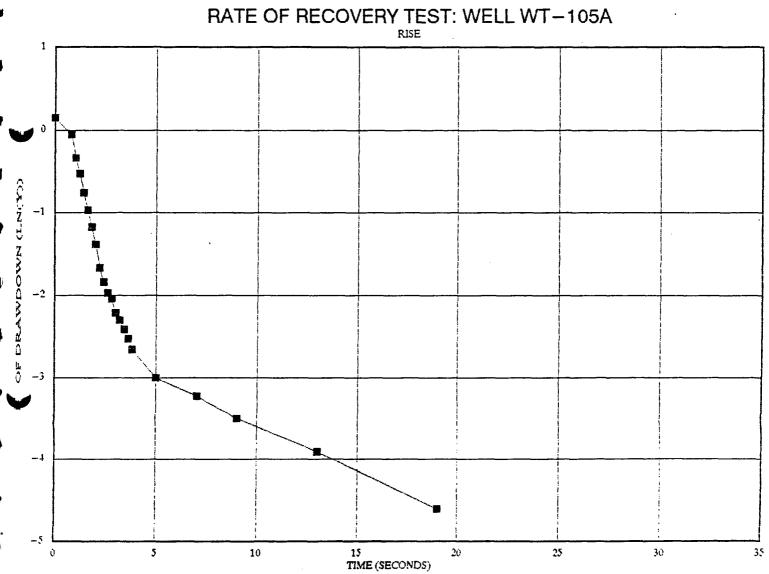


BOUNEP AND FIGE METHOD FOR INTERPRETATION OF SLOS TESTS: FOR UNCONFINED AND LEADY CONFINED ADDIFERS.

TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MAKED BY AN "I".

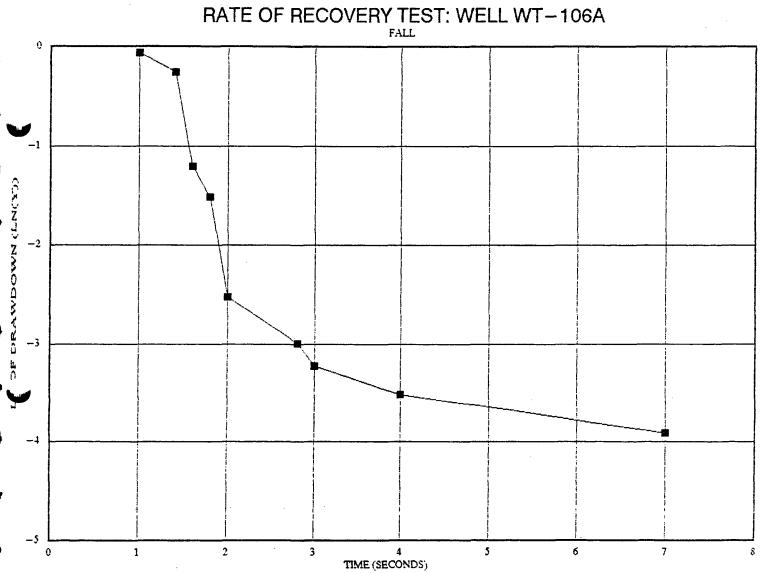
PROGRAM CAN INCLUDE EFFECTS OF SANDPACH DEWATERING (ASSUMING WATER IS RIGHMS WITHIN THE SANDFACK).

	::::	rime ministrorrer Time ministrepth t	D: DEAWDDUN	:TIME ser	: iN	. #FROJECT MAME : ::::::::::::::::::::::::::::::::
:						: #PROJECT NO : 20026.024
						SHELL NO SHT-105A RISE
. 1	i	6.82	1.160	0.00		ANALYST : :ELIAS
1 2	:	7.03			1-0.0513	: #DATE COLLECTED :12-14-96
: 3	;	1 7.26	0.720			
: 4	ł	7.39	0.590	1 1.26	0.527c	TRISER PIPE (ID):
: 5	:	7.51	0.470	1 1.40	1-0.7550	: #EFFECTIVE SCREEN LENGTH: (L) = 10.08 Ft.
: 6	;	1 7.50				: #MAX DRAWBOWN (1K SUBSET): (Ymax) = 0.95 Ft.
7		1 7.67				: #STATIC WATER LEVEL: (SWL) = 7.98 Ft.
! 8		1 7.73				DEFTH FROM SNL TO EFF. SCREEN BOTTOM: (H) = 10.08 Ft.
: 9	-	1 7.79				* REST. AQUIFER DEFTH (SWL TO AQUIFER BOTTOM): (D) # 175.00 Ft.
: 10	-	1 7.82				: #INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)?
111		7.84		2.60	1-1.9661	: #SANDPACK'S SPECIFIC YIELD (Sy) = 0.10
: 12		; 7.85 ; 7.87				1 EDUNCO AND DISC SIGNIC PREPRIETA.
13		1 7.89				BOUWER AND RICE CURVE COEFFICIENTS:
: 14 : 15		1 7.89		1 7.40	1-2.3020	: RATIO OF L/(r sub w) = 36.24 :106 OF L/(r sub w) = 1.4806
1 15		7.90				FOR PARTIALLY PENETRATING WELLS-
17		7.91			1-2.6593	
18		7.93				B = 0.34
19		7.94				FOR FULLY PENETRATING WELLS-
20		1 7.95		9.00		
21		7.96			1-3.9120	· · · · · · · · · · · · · · · · · · ·
22		1 7.97				EVALUATION OF LN(Re/(r sub w)):
23		7.98		32.00		
24	:	:	;	1	1	CONST.2 = 6.2041 =(MAX, OF 6.0)= 6.0000
25	;	;	:	!	;	: CDNST.! = 0.3227 : CDNST.2 = 6.2641 =(MAX. OF 6.0)= 6.0000 : LN(Re/(r sub w) = 2.13
26	:	;	;	1	;	EFFECTIVE r sub c (for sandpack dewatering) = 0.0833 (1/7)(LN(Yo/Yt)) (SLDPE) = -8.62E-01 sec^(-1)
27		:	:	:	:	EFFECTIVE r sub c (for sandback dewatering) = 0.0833
28		1	i .	;	:	(1/T)(LN(Yo/Yt)) (SLOPE) = -8.62E-0) sec^(-1)
29		:	:			
30		i	1	!		HYDRAULIC COMBUCTIVITY (K) = 6.32E-04 ft/sec : (===================================
31		:		:		1.93E-02 ce/sec (Excernence
32		į				1.93E-02 ce/sec (===================================
33 34			i		i i	Regression Output:
35		i	i		, ;	Constant 4.33E-01
36			,			R Squared 0.9766
37		,	1			No. of Deservations
38		;		:		Depress of Freedox 14
39 :		:	:		,	Nea. sea at the const
40 3		i	:	:		I Coefficient(s) -0.62E-01
41						Std Err of Coef. 0.0357
42				:		· · · · · · · · · · · · · · · · · · ·
43		,				



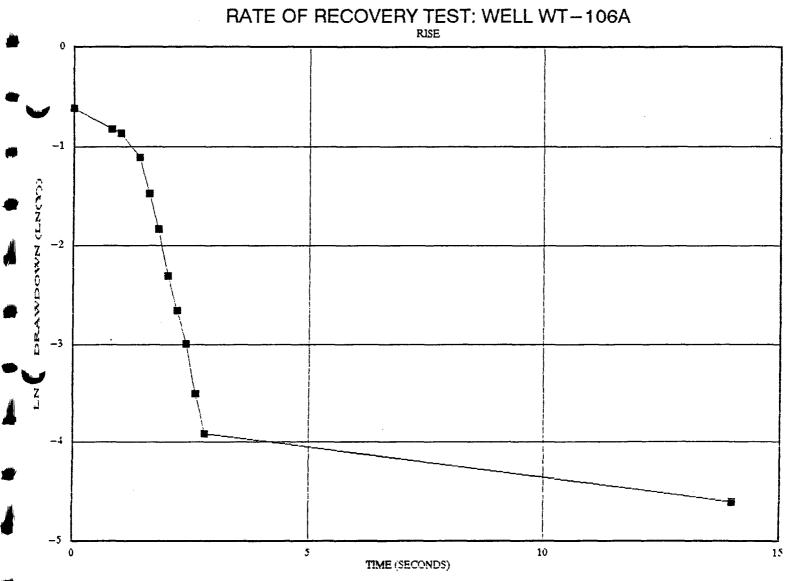
BOUNES AND RICE METHOD FOR INTERPRETATION OF SLUB TESTS: FOR UNCONTINED AND LEARY COMPINED ADUITERS. TO UNITED BY AN "T".

₹ £	: :	5	39	#	37	<u>د</u>		3	¥	ដ 	<u>ಚ</u>	발 	성	76	28 :	27	26	23	2	ä	23	8	19:	æ	17	ë.	H	=	:	12	=	<u>.</u> .	-a	œ 	-1	o- 	.n	-	٠. 	2 :-	<u>-</u>	1			****
																																											3	三满 計	120422
	•																	••				 		•	•	••						9.64	 9.95	9.00	9.07	. 5.10	5.24	: 5.32	9.80	9.96	: 9,62		WATER Ft.!	ITTIME MINISEFFR TO: DRAWDOWN ITIME Sec I	
	•	••	••	••		•		••	•-													 										6,526	0.030	0.040	0.050	0.030	0.226	6.300	: 6.780	0.940	0.000		3	: BRANDONN	I RESERVE TRE
	-		••			• •		•••								••					•	 	••									.00	. 4.00		;;g	.00	1.80	1.60	1.40	1.00	9.00	-	Ξ.	THE Sec	*********
	-																					 										.00 :-3.9120 :	1.00 1-3.5066 :	:-3.2189 :	1-2.9957	:-2.5257	.80 :-1.5141 :	1-1.2640	1.40 :-0.2425 :	1.00 !-0.0519 :	2		3	;; ;;	*********
SID CIT OF LOWI.	C+ 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	I Coefficient(s)		Degrees of Freedom	No. of Ubservations	n poueren	D Campad	Std Err of Y Est	Constant				HYDRAULIC CONDUCTIVITY		(1/T)(LN(Yo/Yt)) (SLOPE) =	EFFECTIVE 7 Sut		LN(Re/(r	COMST.2 =	COMST.1 =	EVALUATION	- 3	FOR FULLY PENETRATING WELLS-	***	· 30-	FOR PARTIALLY F	LOB OF L/(r sub w) =	RATIO OF L/(r sub w) =	BOUWER AND RICE (#SANDPACK'S SPECIFIC YIELD (SY) =	RENCLUDE SANDPACK	BEST. ABUTTER DEPT	SDEPTH FEGM SWC TO	137ATIC MATER LEVEL:	MARK DROKOURA - IA GURDOTTI	REFECTIVE BUREEN LENGTH:	DEFFECTIVE SCREEN	BRISER FIFE (ID):	STATE COLLECTED	SANAL YST	新に表	SPROJECT NO	SERDJECT NAME	
				-	25					Regression Output:			1V1TY (K) =	į) (SLOPE) =	EFFECTIVE r sub c (for sandpack dewatering) *		LN(Re/(r sub w) =	± 6.2091	a 0.3310	EVALUATION OF LN(&e/ir sub w)):	= 1.77	•	0.32		FOR PARTIALLY PENETRATING WELLS	r sub w) =	(B #) *	BOUWER AND RICE CURVE COEFFICIENTS:		IC VIELD (Sy) =	THISLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)?	BEST. ABUIFER DEPTH (SWL TO MADUFER MATTOM):	ADEPTH FEGS SWC TO EFF. SCREEN BOTTON: (H)	LI (SIL)	SUFFETTE: - reax?		TREFECTIVE SCREEN DIAMETER: C r sub m! =	= (3 dus 7 3)	:12-1-90	:ELIAS	1743 9901-191	20026.024	:HIMCO	******************
4. 1. 2.	0.4797	-3.57E+00		2		4.754.7	2 0 2 2	0.2139	4.705+00		***************************************	8.40t-02 ta/set	2.76E-03 ft/sec		-3.57E+00 sec^(-1)	atering) * 0.0833		2.06	1 =(MAX. OF 6.0)=	•	••	7		1.3	· e-		1.4433	27.75	;	*************	0.10	IF YES, 0 IF NO)?	TTD:: (D) *	(H) = 5.25 Ft.	9,62 51.	= -i, 78 ft.	∓ 9.25 Ft.			•					****************
										1-1-00 V	3 4 CL - 3 7 6	(**************************************	(252255555555555	. 1			********************		6.0000											******************		•	175.00 Ft.	. .				(4.3333 (radius in ft.)	0.9833 (radius in ft.)						



BOUNER AND RICE METHOD FOR INTERPRETATION OF SLUE TESTS: FOR UNCONFINED AND LEAKY CONFINED ADUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN *2".
FROEROM CON INCLUDE EFFECTS OF SANDPACK DENATERINE (ASSUMINE WATER IS RISING WITHIN THE SANDPACK).

:	ISTIME manisbepte TO:	DRAWDOWN	TIME sec	: LN	: #PROJECT MAME :HIMCD	
:	! (X) IWATER Pt.1	(¥)	(X1)	(Y)	: #PRDJECT ND : 20026.024	
	.{}		{	!	SELF NO CHARLES ON LIGHT	
: 1	: E.4E 1	6.540	6.00	1-0.6162	: RAMALYST :ELIAS	
1 2					: #DATE COLLECTES ::2-1-90	
: 3	: B.60 :	0.420	1.00	-0.8475	. \$83558 FIFE (18): (1 f sub c) = - 2.6 in. =	0.0833 (radius in ft.)
: ;	. 2.44	6.336	1.40	1-1.1057	. TEFFECTIVE SCREEN DIAMSTERVIS & Sub w) = 5.0 in. =	0.3333 (radius in ft.)
. 5		0.230			: #EFFECTIVE SCREEN LEAGTH: (L) = 9.25 Ft.	
: 6	1 6.86 1	0.160	1.80	:-1.832è	: smax DRANDOWN (IN SUBSET): (Ymax) = 0.33 Ft.	
: 7	: 8.92 ;	0.100	2.00	1-2.3026	: #STATIC WATER LEVEL: (SWL) = 9.02 Ft.	
: 8	1 1 8.95 1	0.076			DEPTH FROM SHI, TO EFF. SCREEN BOTTOM: (H) = 9.25 F	t.
. 9	: B.97 :	0.050	2.40	1-2.9957	: BEST, ADUIFER DEPTH (SML TO ADUIFER BOTTOM): (D) =	175.00 Ft.
10		6.030	2.60	1-3.5066	# INCLUDE SANDPACK DENATERING (ENTER 1 IF YES, 0 IF NO)?	0
: 11		0.020	2.R0	1-3.9120	SANDPACK'S SPECIFIC YIELD (Sy) = 0.10	,
1 12						
: 13					BOWER AND RICE CURVE COEFFICIENTS:	
14					! RATIO OF L/(r sub w) = 27.75	
15	•		•		LDE OF L/(* sub w) = 1.4433	
1 15			;		FOR PARTIALLY PENETRATING WELLS	
17			•	;	A = 2.36	
18			,	;	B = 0.32	
: 19			;	;	FOR FULLY PENETRATING WELLS	
20			;	;	C = 1.77	
20				:	1111	
22				:	EVALUATION OF LN(Re/(r sub w)):	
22				,	CONST.1 = 0.3310	
23				:	CONST.7 = 0.3310 = (MAX. OF 6.0)=	6.0000
25			i		: LN(Re/(r sub w) = 2.06	6.0000
26			ì •	1	: LMIRE/(F \$00 M) - 2.VD	
			i •			
27			i	:	EFFECTIVE r sub c (for sandoack dewatering) = 0.0833 (1/7)(LN(Yo/Yt)) (SLOPE) = -2.00E+00 sec^(-1)	
28			<u>.</u>	•	\ \ \ \ \ \ \ \ \ \ \ \ \	
29				•	• •	(\$\$222222222222222
30			i			
31			i		4.71E-02 cm/sec 1	(5122222222222222
32			i	i	**************************************	£21.4-2.85
33				i	Repression Output:	L (, , , , , , , , , , , , , , , , , ,
34					Constant 1.73E+00	
35					Std Err of Y Est 0.0458	
36	•		;		R Squared 0.9981	
37				•	kc. of Observations B	
38					Degrees of Freedom 6	•
39				:		
46		1			1 Coefficient(s) -2.00E+00	
41 1		1		:	Std Err of Coef. 9.0353	
42				;		
43	1 1	1		}		



APPENDIX B IN-FIELD HYDRAULIC CONDUCTIVITY SLUG TEST FIELD FORMS

Donohue Engineers	INFIELD HYD	RAULIC SLUG TI		CTIVITY	SHEET_	OF
SCIAPTISTS				_	_	
PROJECT NO.: 20	026.023	_ · WEI	L NUMBER:	Ploa	<u> </u>	
SITE: HIMCO	DUMP	LOG	GER ID NUMBE	R:	<u> </u>	
CLIENT: USEPA			AL DEPTH OF V			
	ohn Mathes & Asso		TH OF WATER I			·
	o: Jan 4, 1991	INIT	AL TRANSDUCE	ER WATER LE	EL: <u>4.76</u>	
TIME TEST PERFORME	o:		TIC TRANSDUC			
TOP OF PIPE ELEVATIO			METER OF BOR		·	
	EZOMETER (gircle):	_ DIAM	METER OF PIPE	- 2 "		
FALL/RISE EST (circle)		_ SCR	EEN LENGTH:	5 4	et o	
	EENED IN: OUTWASH	_ EFF	ECTIVE SCREEN	NLENGTH* "L"	· 4 tee	<u> </u>
STATIC WATER LEVEL (t.c.p.): <u>8.87</u>		•			
	7- 0.					
Data Logger	T-Bar Protective Casing		SILOG II	LOGGING SE	T	51.4505
	2" PVC Casing	SEGMENT	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION	ELAPSE TIME
***************************************	יוטאר אינוערוטרוטרוערערער		READINGS	(350.)	(SEC.)	(SEC.)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2				
!		3				
; [		4				
سلسلب		5		***************************************		
		6			<u> </u>	
.	lacksquare	<u>7</u> 8		_		
Pressure	₩ater Level	9		<del></del>		
Transducer	Stainless Steel Slug	10				
		11				
<b>#</b> }	Bentonite Seal	12				
1 7	Silica Sand	13 14				
	Weil Screen	15				
		16				
*"L" length is less than the the water table intersects will equal distance betwe bottom of sand pack.	sand pack, where "L"		RANSDUCER PS TEEL SLUG LEN			
NOTES:						<del></del>
				<del></del>		
			<del></del>	<del> </del>		
TEST PERFORMED BY:	TOM PUCHALSKI		Jan, 4			
LOGGER DOWNLOADED	BY: K. Elas	DATE	<u>: V14</u>	<u>191</u>		<del></del>
CALCULATIONS BY:	N MER P	_ DATE	<u></u>			

Donohue RAGINEERS	INFIELD HYD	RAULIC SLUG TE		CTIVITY	SHEET	OF
PROJECT NO.: <u>2002</u> SITE: <u>HIMCO DU</u>	6.023	WEL	L NUMBER:	ፈን ረገ		
CLIENT:	1140 ETER (circle):	DEP INITI STA DIAM DIAM SCR EFFI		IN WELL: ER WATER LEV ER WATER LE EHOLE:	91,00 rel: <u>10.4</u> rel:	
Data CT	-Bar		SILOG II	LOGGING SEC	QUENCE	
Logger	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
**************************************	HAZHIHARAZAIHA	11	25	1/5	5	5
! ! ! ! !	! '	2	25	1	25	30
	;	3	10	3	3020	<b>605</b> 0
	┷ [	4	30	5	150	, <del>,</del> 200
سلسلس	_	5				
		6				
-	·	7				
Pressure	₩ Water Level	8				
Transducer	-	9				
Transducer T	Stainless Steel Slug	10				
		11				
	Bentonite Seal	12				
一 图 ■	> Silica Sand	13				
	Jille Sano	14				
	Well Screen	15				<del></del>
		16				
**L* length is less than the sand the water table intersects sand the water table intersects sand the water table intersects sand the water table intersects sand pack.  NOTES:	back, where "L" er table and		RANSDUCER PS EEL SLUG LEN		feet	
TEST PERFORMED BY:	PUCHALSKI	_ DATE	<u> </u>	101		

Donohue Engineers	INFIELD HYD	RAULIC SLUG TE		CTIVITY	SHEET	OF
SCIANTISTS	v 627		L NUMBER:	DIALC		
PROJECT NO.: 3003						
SITE: HIMCO DI	UMP	LOG	GER ID NUMBE	:R:		<del></del>
CLIENT: USEPA		TOT	AL DEPTH OF V	VELL:	16267	,
WELL DRILLED BY: John	n Mathes & Associ	C.I'M DEP	TH OF WATER	NWELL: 9	133 4.5	7
DATE TEST PERFORMED:	/ 🔿 ) '		AL TRANSDUCE			
TIME TEST PERFORMED:		_	TIC TRANSDUC			
TOP OF PIPE ELEVATION:			METER OF BOR			
OBSERVATION WELLEPIEZO	METER (circle):		METER OF PIPE			
FALL RISE TEST (circle)		_	EEN LENGTH:			<del></del>
FORMATION WELL SCREEN			ECTIVE SCREET			<del></del>
STATIC WATER LEVEL (T.C.I					- <del></del>	
		,	·			
Data Logger	T-Bar	<u></u>	SILOG II	LOGGING SEC		
	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
**************************************	THE THE THE THE THE	1	5	V5		
! ! ! !		2	\$	1/5		
; ] ] ]		3			<u> </u>	3
1111		4				
		5 6	<del></del>			<del>- 5</del>
711		7		'\		9
Pressure	Water Level	8				ह
Transducer	1 -	9				Ò
Transoucer T	Stainless Steel Slug	10				i¢
	2 4 1 6 1	11	25	115	5	5
<b> </b>	Bentonite Seal	12	a <u>5</u>		25	30
1	Silica Sand	13	10	<u> </u>	20	50
4	Well Screen	14	30		150	<u> 200</u>
	Well Street	16				·········
"L" length is less than the sa	nd nack length if		PANSDUCER PS	ii: 5	<u></u>	
he water table intersects san vill equal distance between w pottom of sand pack.	d pack, where "L"		TEEL SLUG LEN			
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					- 2
NOTES: Roman tos	t at 1241 '	statica	03 two	Source !	5 Tatic 9.	48
11.43-Static st	tert rising tes	<u>t - 4</u>	foor to	5+		
			<del> </del>	<del></del>	<del></del>	
TEST PERFORMED BY:	TH DINHAICKI	DATE	: 114191		<del>.,,</del>	<del></del>
LOIFLIN CHARLE DINL		-				<del></del>
	· ( F) 24		• \/ \<\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
OGGER DOWNLOADED BY:		_	: 1/14/01			<del></del>
	<b>Υ=</b>	_	- // (4 / U)			

DELENT: USEPH  TOTAL DEPTH OF WELL: 175,57  DEPTH OF WATER IN WELL: 1,60  INITIAL TRANSDUCER WATER LEVEL: 7,96  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 7" TD  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DIAMETER OF PIPE: 1" TD  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DIAMETER OF DIAMETER OF DIAMETER COPING  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DIAMETER OF PIPE: 1" TD  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DIAMETER OF PIPE: 1" TD  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DIAMETER OF PIPE: 1" TD  SCREEN LENGTH:  SEGMENT NUMBER OF INTERVAL SEGMENT TIME (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.)	ARCHITECTS SGIMPTISTS	•	SLUG TE	-01			
SITE: # IMAGE. LOGGER ID NUMBER: 7/9C21  SUENT: USEPH  MELL DRILLED BY: DEPTH OF WELL: 1/75, 55"  DEPTH OF WATER IN WELL: 1/1, 60"  INITIAL TRANSDUCER WATER LEVEL: 7, 96"  TOP OF PIPE ELEVATION: DIAMETER OF BOREHOLE: DIAMETER OF PIPE: 1" TD  SCREEN LENGTH: SCREEN LENGTH: 1":  STATIC WATER LEVEL (T.C.P.):  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE  DATE	PROJECT NO.: 200	26.023	_ WEL	L NUMBER:	E-3		
DEPTH OF WELL: 175.58"  WELL DRILLED BY: DEPTH OF WELL: 11.60"  DATE TEST PERFORMED: 12-14-90 INITIAL TRANSDUCER WATER LEVEL: 7.96"  DATE TEST PERFORMED: 11.1 STATIC TRANSDUCER WATER LEVEL: 7.96"  DOMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DI				· · · · · · · · · · · · · · · · · · ·		021	
DEPTH OF WATER IN WELL:			<del></del>				
DATE TEST PERFORMED: 12-14-90  INITIAL TRANSDUCER WATER LEVEL: 7, 16  STATIC TRANSDUCER WATER LEVEL: 7, 96  TOP OF PIPE ELEVATION:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 1" ID  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH***L*:  STATIC WATER LEVEL (T.C.P.):  DATE  Logger  Protective Casing  SEGMENT NUMBER OF INTERVAL SEGMENT TIME (SEC.)  SEC.)  SEGMENT NUMBER READINGS (SEC.)  SEC.)  SEC.)  SEGMENT NUMBER READINGS (SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  SHART Level  S	CLIENT: VSEP	A	тот	AL DEPTH OF V	VELL:	5,581	
TIME TEST PERFORMED:							
DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE:			•				
DIAMETER OF PIPE: 3" TD  FALL/RISE TEST (circle)			_			/EL: <u>7,96</u>	<u> </u>
SCREEN LENGTH:  FORMATION WELL SCREENED IN:  STATIC WATER LEVEL (T.C.P.):  Data Logger  Frotetive Casing  2" PVC Casing  NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  1			_			- >	
FORMATION WELL SCREENED IN:  STATIC WATER LEVEL (T.C.P.):  Data Logger Frite-tire Casing 2" PVC Casing NUMBER OF INTERVAL SEGMENT TIME (SEC.) NUMBER READINGS (SEC.) 1							
STATIC WATER LEVEL (T.C.P.):  Data Logger Protetive Casing 2° PVC Casing NUMBER OF INTERVAL SEGMENT TIME (SEC.) VICE.) 1 50 0.2 10 10 (SEC.) (SEC.) 2 15 1 15 15 15 15 15 15 15 15 15 15 15 1							
SILOG II LOGGING SEQUENCE  Protective Casing SEGMENT NUMBER OF INTERVAL (SEC.)  2" PVC Casing NUMBER NUMBER OF READINGS (SEC.)  1 50 0. Z 10 10  2 15 15 5 75 75  4 10 15 15 15  6 7 1 50 0. Z 10 10  Fressure Transducer Stainless Steel Slug 19 4 15 30 450 450 450  Bentonite Seal 12  Silica Sand 13  Well Screen 15  16 PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  16 PRESSURE TRANSDUCER PSI: 15  17 Interval SEGMENT DURATION (SEC.)  SEGMENT DURATION (SEC.)  SEGMENT DURATION (SEC.)  11 1 1 50 0. Z 10 10  12 15 15 15  13 15 75 75 75  14 10 15 15  16 15 16 15 16  PRESSURE TRANSDUCER PSI: 15  16 TRANSDUCER PSI: 15  17 Interval SEGMENT DURATION (SEC.)  PRESSURE TRANSDUCER PSI: 15  16 TRANSDUCER PSI: 15  TAINLESS STEEL SLUG LENGTH: 4'  STAINLESS STEEL SLUG LENGTH: 4'		***************************************		LUTIVE SUMEE!	· LENGIA - "L"	•	
Pressure  Transducer  Segment Number Readings (Sec.)  Water Level  Stainless Steel Slug  Bentonik Seal  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings (Sec.)  Segment Number Readings  Segment Number Readings  Segment Number Readings  Segment Number Readings  Segment Number Seal  1	GIANG WAIER LEVEL (I.	······································					
Protective Casing SEGMENT NUMBER OF INTERVAL SEGMENT TIME (SEC.)    1	Data			SILOG II	LOGGING SE	DUENCE	
1   30   C.Z   10   10   15   15   15   15   15   15	Logger	Protective Casing	SEGMENT	NUMBER OF	INTERVAL		
2   15   1   15   15   15   15   15	, — ı	<del></del>	NUMBER		(SEC.)		
Rressure  Water Level  Stainless Steel Slug  Bentonite Seal  Well Screen  Well Screen  The water table intersects sand pack, where "L"  Will equal distance between water table and  STAINLESS STEEL SLUG LENGTH:  Water Level  Bentonite Seal  13  14  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Well  STAINLESS STEEL SLUG LENGTH:  Well  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG	***************************************	THE THE THE THE THE THE THE THE THE THE			0.2		10
Pressure Transducer  Water Level Stainless Steel Slug  Bentanite Seal  Well Screen  Well Screen  The water table intersects sand pack length if he water table intersects sand pack, where "L" will equal distance between water table and  A 15 30 450 450  TO 10  D 10  A 2 15 15  A 3 15 5 75  A 3 15 5 75  A 4 15 15  A 5 15 15  A 6 15  A 7 1 50 0.2 10  A 7 1 5 15  A 7 1 50 0.2 10  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15  A 7 1 5 15	- 11						
Fressure  Fressure  Fressure  Fressure  Fransducer  Stainless Steel Slug  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Bentonite  Ben	:						
Pressure Transducer  Water Level  Stainless Steel Slug  Bentonik Seal  Silica Sand  Well Screen  Well Screen  The water table intersects sand pack, where "L"  will equal distance between water table and  Water Level  Bentonik Seal  10  10  10  10  15  15  15  16  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:	لمكسك		5			7.30	7.70
Pressure Transducer  Stainless Steel Slug  Bentonike Seal  Silica Sand  Well Screen  Well Screen  The water table intersects sand pack, where "L"  will equal distance between water table and  Water Level  B Z 15  15  15  10  U 15  30  450  450  450  450  11  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH							
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Bentonik Seal    12     13     14       15     16     16	Transoucer	Stainless Steel Slug	18 Y	15	30	450	
Si/ica Sand  13  14  15  16  TL" length is less than the sand pack length if he water table intersects sand pack, where "L" will equal distance between water table and  STAINLESS STEEL SLUG LENGTH: 4'		Restail Seel					
"L" length is less than the sand pack length if he water table intersects sand pack, where "L" sTAINLESS STEEL SLUG LENGTH:		5 kg					
The length is less than the sand pack length if the water table intersects sand pack, where "L" will equal distance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between water table and stance between	, N <b>a</b>						
"L" length is less than the sand pack length if he water table intersects sand pack, where "L" stainless STEEL SLUG LENGTH: 4		Well Screen					
	<u>↓                                    </u>			<u> </u>			
	the water table intersects s will equal distance betwee	sand pack length if sand pack, where "L" n water table and		RANSDUCER PS FEEL SLUG LEN	il:/		
	NOTES:I denti	lid as 53	<u> </u>		<del></del>		
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NOTES: I dentified as 53							
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C .	TEST PERFORMED BY: 1	Keich E. Sivis	IR DATE	12-	14-90		
TEST PERFORMED BY: T. Korch E. Siusse Date: 12-14-90	OGGER DOWNLOADED I						- 1

DOROTUE ENGINEERS ARCHITECTS SCIENTISTS	INFIELD HYD	SLUG TE		0111111		OF
PROJECT NO.: 200	026023	WEI	L NUMBER:	F-2		
SITE: HIMO	<del></del>	_ ro	GER ID NUMBI	R: 7190	0.2/	<del></del>
CLIENT: FPA		TOT	AL DEPTH OF V	VELL: > i.f.	501	
WELL DRILLED BY:			TH OF WATER	IN WELL:	13.95	
_	12-2-90	INITI	AL TRANSDUC			
	<u>M50.</u>	_ STA	TIC TRANSDUC	ER WATER LE	ÆL: <u>10.0</u>	6
TOP OF PIPE ELEVATION:		DIAN	METER OF BOR	EHOLE:		
OBSERVATION WELL/PIEZ	OMETER (circle):	_ DIAN	METER OF PIPE	: <u> </u>		
FALL/RISE TEST (circle)	Boin	SCR	EEN LENGTH:			
FORMATION WELL SCREE	NED IN:	EFFI	ECTIVE SCREE!	N LENGTH* "L"	·	
STATIC WATER LEVEL (T.C	.P.):	-				
Data	-T-Bar	-	SILOG II	LOGGING SEC	DUENCE	
Logger	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
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: 111		2	15		15	15
; {		3	15	5	75	75
	┵	<u> </u>	15	30	450	450
		<u>5</u>				
	}	7				
Pressure	Water Level	8				
Transducer	! -	9				
/ disorter	Stainless Steel Slug	10	·			
	Bentonite Seal	11				
———第   <b>3</b>	Silica Sand	12				
	5ilica Sand	13 14				
	Well Screen	15				
		16				
"L" length is less than the sa he water table intersects sar vill equal distance between to tottom of sand pack.	nd pack, where "L"		IANSDUCER PS EEL SLUG LEN	11		
IOTES: Identifi	ed As 02					
EST PERFORMED BY: ( ). F	Fible, T. KOACK	DATE	: 12-2-6	10		
OGGED DOMAII OADED BY	: O Fenske	DATE				
COOCH DOMINED BY						
•	: <u> </u>		·			

Donohue	INFIELD HYD	RAULIC	CONDU	CTIVITY	SHEET_	OF
ARCHITA	icts (	SLUG TI	EST			
i	0026 023		LL NUMBER:			
SITE: HIMO		LOC	GER ID NUMBE	R: 7190	21	
CLIENT: EPA	1	TOT	AL DEPTH OF V	VELL: 31	.3'	
WELL DRILLED BY:			TH OF WATER	N WELL:	R.45'	
DATE TEST PERFOR	MED: 12-2-90	INIT	IAL TRANSDUCI	ER WATER LE	VEL:	
TIME TEST PERFORI	MED: <u>0915</u>	STA	TIC TRANSDUC	ER WATER LE	VEL: 10.	05'
TOP OF PIPE ELEVA	TION:					
OBSERVATION WELL	L/PIEZOMETER (circle):	DIAM	METER OF PIPE	2"		· .
FALL/RISE TEST (circ	se) Both				······	
FORMATION WELL S	CREENED IN:	EFF	ECTIVE SCREE!	N LENGTH* "L	•	
STATIC WATER LEVE	EL (T.C.P.):					
Data	T-Bar		SILOG II	LOGGING SE	QUENCE	
Logger	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
***************	THE WASHINGTON	1	50	0.2	10	(GEO.)
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		3	15	2_	30	30
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		5 6		<u></u>		
	T111	7			<del> </del>	-
Pressure	Water Level	8				
Transducer	1111 -	9				
, 4,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Stainless Steel Slug	10			<u> </u>	
	Bentonite Seal	11				
<b>—</b>		12 13				
ŢĘ	> Silica Sand	14				
- 6	Well Screen	15				
<u> </u>		16				
	cts sand pack, where "L"		RANSDUCER PS TEEL SLUG LEN	- //	,	
NOTES: Kent	hed as OI				· · · · · · · · · · · · · · · · · · ·	
- Well No						
•			12-2	-90		
TEST PERFORMED BY	Y: CFRIPKY . T. KOACA	_ DATE	<u> </u>			
TEST PERFORMED BY	Y: CFKIPA: T. KACK- DED BY:	_ DATE				
LOGGER DOWNLOAD	Y: (FRIPLE, T. KOACK	_ DATE				

~;·	Donohue Engineers ARCHITECTS SCIENTISTS	INFIELD HYD	SLUG TE	-	CHVIT	U. 1221	/_ OF _/_
	PROJECT NO .: 200	24 023	WEL	L NUMBER:	11-1		
	SITE HIMCO		LOG	L NUMBER:	R: 7/9	071	<del></del>
							<del></del>
	CLIENT: EPA		TOT	AL DEPTH OF V	VELL: 104	1.50'	
	WELL DRILLED BY:			TH OF WATER			<del></del>
	DATE TEST PERFORMED:	12-2-90		AL TRANSDUCI			
	TIME TEST PERFORMED:	1130		TIC TRANSDUC			8
	TOP OF PIPE ELEVATION:		DIAN	AFTER OF BOR	EHO! E.		<del></del>
سى.	CESERVATION WELL PIEZO		— DIAN	METER OF PIPE	: Z"		
·	FALL/RISE TEST (circle)	Both	SCR	EEN LENGTH:			
	FORMATION WELL SCREEN		<del>_</del>	ECTIVE SCREE!			
	STATIC WATER LEVEL (T.C.	P.):	_				
	Data	-T-Bar		SILOG II	LOGGING SE	QUENCE	
	Logger	Protective Casing 2" PVC Casing	SEGMENT	NUMBER OF	INTERVAL	SEGMENT	ELAPSED TIME
			NUMBER	READINGS	(SEC.)	(SEC.)	(SEC.)
	**************************************	FREHERIEN.		50	02	10	15
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-			4	15	30.	450	-450-
;	الملكسات ا		5				
	I ———		<u> </u>	50	0.2	10	10
		<b>V</b>	7 <u>2</u>	15	2	30	15 30
	Pressure	¥ Water Level	9,4	-i5 30	70	150	
	Transducer	Stainless Steel Slug	,40 T	نعا	10	60	ز) ر)
		1 , )	11				
	<b> </b>	Bentonite Seal	12				
	1 1	Silica Sand	13				
		Well Screen	15				
		6	16				
	**L* length is less than the sa		PRESSURE TE	ANSDUCER PS			
	the water table intersects sar will equal distance between		STAINLESS ST	TEEL SLUG LEN	IGTH: <del></del>	, <del></del>	
	bottom of sand pack.						
	NOTES: FAILING	المعالم المراجع		Co. Friend	. 1 1 (	かかく	
	NOTES: PATICAL	MINICI TEST JU	P V	127 (11)V		is com	أحظراه
			De Y	a sury	71.	<u> </u>	DEX CI
	Station ID	# 3			<del></del>		
	TEST PERFORMED BY: C. F	· · · · · · · · · · · · · · · · · · ·	/_ DATE	12-	7-91		
	LOGGER DOWNLOADED BY		_	<del>-</del>			<del></del>
			-	:			
	CALCULATIONS BY:			" <del></del>			

Donohue Engineers	INFIELD HYD	RAULIC SLUG TI		CTIVITY	SHEET_	OF
PROJECT NO.: 2002 SITE: HIMLO	26 023	WEL	L NUMBER:			
CLIENT: EPA WELL DRILLED BY: DATE TEST PERFORMED: _ TIME TEST PERFORMED: _ TOP OF PIPE-ELEVATION: _ DBSERVATION WEAL/PIEZO FALL/RISE TEST (circle) _ FORMATION WELL SCREEN STATIC WATER LEVEL (T.C.	12-2-12 11-35-12 DMETER (circle): Boil	DEP  INITI  STA  DIAN  DIAN  SCR  EFFI	AL DEPTH OF V TH OF WATER I AL TRANSDUCI TIC TRANSDUC METER OF BOR METER OF PIPE METER LENGTH: ECTIVE SCREEN	N WELL: ER WATER LEV ER WATER LEV EHOLE: EL Z'	15 25 ** FEL: <u>- タ ひ</u>	3′
Data C	T-Bar		SILOG II	LOGGING SEC	DUENCE	
Logger	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
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111		2				<del> </del>
! ! ! !		3				<del></del>
الملكنة ا		5				
		6				
111		7				
Pressure	Water Level	8				
Transducer	Stainless Steel Slug	9		· · ·		
	Janiness Sieer Sing	10				
	Bentonite Seal	11				
一月	<b>2</b>	13				<del></del>
	Silva Sand	14				
	Well Screen	15				
		16				
**L* length is less than the sa the water table intersects san will equal distance between v bottom of sand pack.	d pack, where "L"		VANSDUCER PS TEEL SLUG LEN			
Obstruction	TD # 4 At ~ 16' done on 12-1					hed
TEST PERFORMED BY: CF	couls TKIN	C/\ DATE	12-7	2-90		
LOGGER DOWNLOADED BY						
CALCULATIONS BY:			·			
COMPUTER FILE NAME:		_		<del></del>		<del></del>
COMPUTER FILE NAME:	<del></del>	-				

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TOTAL DEPTH OF WELL: 24, 80  DEPTH OF WATER IN WELL: 15, 27  INITIAL TRANSDUCER WATER LEVEL: 7, C1  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2"  SCREEN LENGTH:  TOTAL DEPTH OF WELL: 15, 27  INITIAL TRANSDUCER WATER LEVEL: 7, C1  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2"  SCREEN LENGTH:  TATIC WATER LEVEL (T.C.P.):  DATA  Loger  Frinchive Casing  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  TATIC WATER LEVEL (T.C.P.):  DATA  Loger  Fransducer  Fransducer  Fransducer  Fransducer  Fransducer  Water Level  Stind I LOGGING SEQUENCE  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEC.)  TIME  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)	DOTIONUE ENGINEERS ASCHITECTS AGGINTESTS	•	SLUG T	EST			
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2   15   1   15   75   75   75   75   75		2" PVC Casing	NUMBER	READINGS	(SEC.)	1	_
3   15   3   75   75     4   15   30   450   450     5   6   1   50   0,2   10   10     7   2   15   1   15   15     6   1   50   0,2   10   10     7   2   15   1   15   15     8   4   15   30   450   450     9   4   15   30   450   450     10   11   10   10     11   10   10	<i>***********</i>	THE THE THE THE THE THE THE THE THE THE	1	<del></del>	0.2	10	
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Pressure Transducer  Water Level  Stainless Steel Slug  Bentonite Seal  10  11  Bentonite Seal  12  Well Screen  15  PRESSURE TRANSDUCER PSI:  Water Level  Fransducer  Fransducer  Stainless Steel Slug  10  11  Bentonite Seal  12  PRESSURE TRANSDUCER PSI:  Frankling Street Study Engath:  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL STUDY ENGATH:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL STUDY ENGATH:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSURE TRANSDUCER PSI:  PRESSU				50	0 2	10	10
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L* length is less than the sand pack length if e water table intersects sand pack, where "L"		Part it Saul					
"L" length is less than the sand pack length if ne water table intersects sand pack, where "L"  14  15  16  PRESSURE TRANSDUCER PSI: / STAINLESS STEEL SLIGHT SNOTH: 2		<b>  123</b>					
"L" length is less than the sand pack length if ne water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI: / STAINLESS STEEL SLIGHT ENGITH: 2		5ilica Sand					
"L" length is less than the sand pack length if ne water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI:		Eli - Well Screen					
ne water table intersects sand pack, where "L" CTAINI ECC CTEEL CLUCK ENGINE TO							
ne water table intersects sand pack, where "L" CTAINI ECC CTEEL CLUCK ENGINE TO	L* length is less than the sa	and pack length if	PRESSURE TR	RANSDUCER PS	SI: 15		
		nd pack, where "L"				/	
			i				
	OTES: 1 which	N (A) 3.2					
	ST PERFORMED BY:	Knick: E. Slugge	A DATE	12-1	4-90		
OTES: 1 which is a a	OGGER DOWNLOADED BY	Keach					
EST PERFORMED BY:     Kach   E. Slusses   DATE: 12-14-90			•				
OTES: 1 which is a a	MICHII ATIONIC DV						

Donohue seguess	INFIELD HYD	RAULIC	CONDU	CTIVITY	SHEET_	/_OF_/_
ARCHITECTS SCIANTISTA	;	SLUG T	EST			
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PROJECT NO.: 20				WTIDI		<del></del>
SITE: HIMGO	)	LO	GGER ID NUMBI	ER: <u>7190</u>	21	
CLIENT: EPA	C +2-11-	TO	TAL DEPTH OF V	WELL:	78.70	7 iv
WELL DRILLED BY:	Dondrue 12-170 MAI		TH OF WATER	IN WELL:	- 11,26	} 'Yze
DATE TEST PERFORMED						
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TOP OF PIPE ELEVATION	:					
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FALL/RISE TEST (circle)	Both	scr				
FORMATION WELL SCRE	ENED IN:	EFF	ECTIVE SCREE	N LENGTH* "L":		
STATIC WATER LEVEL (T.	C.P.):					
	T-Bar	l	SII 00 I	LL OCCUMO SEC	MISNOF	
Data Logger	Protective Casing		T T	LOGGING SEC	SEGMENT	ELAPSED
	2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	(SEC.)	DURATION (SEC.)	TIME (SEC.)
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		2	60	1 second	60	60
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Pressure	Water Level	8				
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		10	ļ		<u> </u>	
	Bentonite Seal	12				
→ 国上	Silva Sand	13				
		14				
	Well Screen	15				
<u> </u>		16	L	15		
**L* length is less than the the water table intersects s	and pack, where "L"		RANSDUCER PS TEEL SLUG LEN	oi:		
will equal distance between bottom of sand pack.	n water table and	STATELOO O	, LLL OLDO LL	.071		
Dista	C. 11. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	de .	المديد	<del></del>	- / · · · · · ·	
NOTES: RISING 4	Falling Head tos	15 MAI	NUALIY ST	opped au	e to ver	4
FAST FG CONEM	4 ———		<u> </u>			
	Child Care b		- 171.14	^		
TEST PERFORMED BY:		_ DAT	12 7 . 1	<u>0</u> 90		
	BY: <u>CATING FRUELE</u>	DAT		10		
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WELL NUMBER: UT / C 2 A  LOGGER ID NUMBER: 7/90 2/1  LILENT: 1/5 C PA  TOTAL DEPTH OF WELL: 18 .1 6  DEPTH OF WATER IN WELL: 10 .297  INITIAL TRANSDUCER WATER LEVEL:  ME TEST PERFORMED: 17.30  DIAMETER OF BOREHOLE:  DEPTH OF WATER LEVEL: 7. C 1  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2"  ALLIPISE TEST (circle): DIAMETER OF PIPE: 2"  ALLIPISE TEST (circle): DIAMETER OF PIPE: 2"  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH** "L":  DATE OF PYCLOWING SECUENCE  TATIC WATER LEVEL (T.C.P.):  DATE OF OF PIPE: 1 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1	LUENT: 1/5 PA  LUENT: 1/5 PA  TOTAL DEPTH OF WELL: 18.16  DEPTH OF WATER IN WELL: 10.29  INITIAL TRANSDUCER WATER LEVEL: 7.01  DIAMETER OF BOREHOLE: 7.01  DIAMETER OF BOREHOLE: 2"  SCREEN LENGTH: SCREEN LENGTH: 1.5  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH  DOTH	LILENT: USEPA  JOHN DELLO PALLENTS: USEPA  JOHN DELLO PALLENTS: USEPA  JOHN DELLO PALLENTS: USEPA DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WATER IN WELL: 18.16  JOHN DEPTH OF WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATER IN WATE	AGCHITECTS SCIENTISTS	•	SLUG TE	EST			
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## Water Level # 3 15 5 75 75    Water Level # 3 15 5 75 75    Stainless Steel Slug	Pressure	Pressure  Water Level  Stainless Steel Slug  Bentonite Seal  Well Screen  Is a sign of the sand pack length if water table intersects sand pack, where "L"  Pressure  Transducer  Stainless Steel Slug  Transducer  Stainless Steel Slug  Transducer  Stainless Steel Slug  Transducer  Fressure  Transducer  Stainless Steel Slug  Transducer  Stainless Steel Slug  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Transducer  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure  Fressure	i	<u> </u>	<del></del>	15	<u></u>		
Pressure Transducer  Water Level  Water Level  Stainless Steel Slug  10  Bentonite Seal  12  Silica Sand  14  15  10  10  10  10  15  15  75  75  75  75  75  75  75  75	Pressure  Water Level  Water Level  Stainless Steel Slug  Bentonite Seal  Solica Sand  Well Screen  Well Screen  15  10  10  10  15  15  15  16  10  10  10  10  10  10  10  10  10	Pressure  Transducer  Water Level  Stainless Steel Slug  Bentonite Seal  Well Screen  Telength is less than the sand pack length if water table intersects sand pack, where "L"  Pressure  To Discuss than the sand pack length if water table intersects sand pack, where "L"  Pressure  To Discuss than the sand pack length if water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI: 15		┸		15	30	450	450
Pressure Transducer  Water Level  Stainless Steel Slug  Bentonite Seal  10  Bentonite Seal  13  14	Pressure  Water Level  Water Level  Stainless Steel Slug  10  Bentonite Seal  Silica Sand  Well Screen  15  16	Pressure Transducer  Water Level  Stainless Steel Slug  10  Bentonite Seal  11  Solica Sand  14  Well Screen  Telength is less than the sand pack length if water table intersects sand pack, where "L"  Pressure  Transducer  Water Level  A 2 15  A 3 15  5 73  75  75  75  75  75  75  75  75  75		<b>-</b>		30	0.2	1/2	10
Pressure Transducer  Water Level  Stainless Steel Slug  10  Bentonite Seal  12  5ilica Sand  14	Pressure Transducer  Water Level  Stainless Steel Slug  10  Bentonite Seal  11  Silica Sand  14  Well Screen  15  16	Pressure Transducer  Stainless Steel Slug  Bentonite Seal  Solica Sand  Well Screen  Telength is less than the sand pack length if water table intersects sand pack, where "L"  Water Level  8 3 15 5 75 75  75  75  75  10  11  11  12  15  16  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSUR				15	1		15
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Silica Sand 13 14	Silica Sand   13   14   15   16   16   16   17   18   18   18   18   18   18   18	Silica Sand  13  14  15  16  PRESSURE TRANSDUCER PSI: 15  water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15  PRESSURE TRANSDUCER PSI: 15		Bentonite Seal					
	Well Screen 15 16	14   15   16   16   16   17   17   17   17   17							
	16	"length is less than the sand pack length if PRESSURE TRANSDUCER PSI: 15"  water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI: 15"  PRESSURE TRANSDUCER PSI: 15"  PRESSURE TRANSDUCER PSI: 15"		L					
		L" length is less than the sand pack length if  water table intersects sand pack, where "L"  PRESSURE TRANSDUCER PSI: 15-18-18-18-18-18-18-18-18-18-18-18-18-18-		- Well Screen					
	I length is less than the sand pack length if PRESSURE TRANSDLICER PSI: 15"	e water table intersects sand pack, where "L" PAINT ESS STEEL OLD LENGTH.		L		ll		<u></u>	
L' length is less than the sand pack length if PRESSURE TRANSDUCER PSI: 15 F	surface table internate and and where II I			pack length if	PRESSURE TR	RANSDUCER PS	s:	<del></del>	
Il equal distance between water table and STAINLESS STEEL SLUG LENGTH: strom of sand pack.				11					
Il equal distance between water table and STAINLESS STEEL SLUG LENGTH:	ttom of sand pack.		DTES: Aentyie	8 as 12	<del></del>	<del></del>	***		
Il equal distance between water table and STAINLESS STEEL SLUG LENGTH:	ttom of sand pack.	DTES: Adentified as 12	<u> </u>						
Il equal distance between water table and STAINLESS STEEL SLUG LENGTH:	ttom of sand pack.	OTES: Adentified as 12							
Il equal distance between water table and STAINLESS STEEL SLUG LENGTH:	ttom of sand pack.	OTES: Adentified as 12							
STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  OTES:	ottom of sand pack.  DTES:				-				
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STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  OTES:	ST PERFORMED BY: \(\frac{1}{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}}\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}}\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\tin\tin\tin_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}}\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi}\ti}\chi_{\chi_{\chi_{\chi\ti}\chi_{\chi\ti}\chi_{\chi_{\chi}\chi_{\chi}\chi_{\chi\ti}\chi_{\chi_{\chi}\chi_{\chi}\chi_{\chi}\chi_{\chi\ti}\chi_{\chi\ti}\chi_{\chi\ti}\chi_{\chi}\chi\ti}\chi_{\chi}\chi\ti}\chi\ti}\chi\chi\chi\ti}\chi\ti}\chi\chi\chi\ti}\chi\ti}\chi\ti\ti\ti\ti\ti\ti\ti\ti\ti\ti\ti\ti\ti	ST PERFORMED BY: Korcl E. Shasen DATE: 12-14-90	NGGER LOWNLOADED BY: 🔼	1.0-0	-				

DONONUE EAUINEERS ARCHITECTS ACCEPTISTS	INFIELD HYD	RAULIC SLUG TI		CTIVITY	SHEET _	OF
PROJECT NO.: 2003	26.023	WEI	L NUMBER:	WT103	A	
SITE: Him			GER ID NUMBE			
						-
CLIENT: USE P	· A	<del></del>	AL DEPTH OF V			
VELL DRILLED BY:		_ DEP	TH OF WATER	IN WELL:	5.46	·
OATE TEST PERFORMED:	12-14-90		IAL TRANSDUC			
TIME TEST PERFORMED:	13:59	_ STA	TIC TRANSDUC	ER WATER LE	ÆL: <u>7.98</u>	
OP OF PIPE ELEVATION:		DIAN	METER OF BOR	EHOLE:2	) <i>il</i>	
BSERVATION WELL PIEZON			METER OF PIPE			
FALL/RISE TEST (circle)		<del></del>	EEN LENGTH:			
ORMATION WELL SCREENS		<del></del>	ECTIVE SCREE			
TATIC WATER LEVEL (T.C.P.						<del></del>
Dala	r-Bar		SILOG II	LOGGING SE	QUENCE	
Logger L	Protective Casing 2" PVC Casing	SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSE TIME (SEC.)
	PHYLHIHAMA PHA	1	50	C.2	10	ic
		2	15	1_	15	15
	[	3	15	5	75	75
!		4	15	30	450	450
سنسلسك		5			<u> </u>	
-111	-	6				
	lacksquare	<u>7</u>				
Pressure	🚆 Water Level	9				
Transducer	Stainless Steel Slug	10				
		11		<del></del>		
	Bentonite Seal	12			·	
	> Silica Sand	13				
	<b>.</b>	14				
	Well Screen	15				
<u> </u>		16	L		L	
L" length is less than the san e water table intersects sand ill equal distance between wa ottom of sand pack.	pack, where "L" iter table and		RANSDUCER PS			
OTES: Adentif	ied on 13					
ST PERFORMED BY: T L	naci E. Shan	2 DATE	: 12-14	-90		
EST PERFORMED BY: 1/2 DOGGER DOWNLOADED BY:	1 Poach	DATE	12-14		· · · · · · · · · · · · · · · · · · ·	
ALCULATIONS BY:	•		<b>:</b>			

WELL NUMBER: LT ICYA  LOGGER ID NUMBER: T190.21  WELL DRILLED BY:  DEPTH OF WATER IN WELL: 13.47  DEPTH OF WATER IN WELL: 11.47  INITIAL TRANSDUCER WATER LEVEL: 51.47  DIAMETER OF PIPE: DIAMETER OF PIPE: 2// 1 7  DIAMETER OF PIPE: 2// 1 7  DIAMETER OF PIPE: 2// 1 7  DORNOTON WELL SCREENED IN: EFFECTIVE SCREEN LENGTH: "L":  DATE TEST (circle)	WELL NUMBER: WT 16 Y A  LOGGER ID NUMBER: T190Z  WELL DRILLED BY:  WELL DRILLED BY:  DEPTH OF WELL: 13.69  DEPTH OF WELL: 13.69  DEPTH OF WATER IN WELL: 11.67  INITIAL TRANSDUCER WATER LEVEL:  STATIC TRANSDUCER WATER LEVEL:  DIAMETER OF PIPE: 2" 3 7  DATE TEST (circle): DIAMETER OF PIPE: 2" 3 7  DATE TEST (circle): SCREEN LENGTH: "L":  DATE TO 0.2 10 10  PROSSURE TEST (circle): SEGMENT NUMBER OF INTERVAL SEGMENT TIME (SEC.) (SEC.) (SEC.)  RECONOMINATION WELL SCREENED IN:  DATE TO 0.2 10 10  PRESSURE TRANSDUCER WATER LEVEL SEGMENT TIME (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.) (SEC.)	Donohue Engineers		SLUG T	EST		•	
CLIENT: USERA TOTAL DEPTH OF WELL: 13.69  VELL DRILLED BY: DEPTH OF WATER IN WELL: 11.67  INTIAL TRANSDUCER WATER LEVEL: G. 0/C  DOR OF PIPE ELEVATION: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER LEVEL: G. 0/C  DATE TEST (circle): DIAMETER OF DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF PIPE: DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF PIPE: DIAMETER OF DIAMETER OF DIAMETER OF PIPE: DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DIAMETER OF DI	CUENT: USEPA TOTAL DEPTH OF WELL: 13.69  DEPTH OF WATER IN WELL: 11.67  DEPTH OF WATER IN WELL: 11.67  DEPTH OF WATER IN WELL: 11.67  DEPTH OF WATER IN WELL: 11.67  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 17  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DATA  TOTAL DEPTH OF WELL: 13.69  DEPTH OF WATER IN WELL: 11.67  INTIAL TRANSDUCER WATER LEVEL: 6.07  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 17  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: 12:  DATA  LOGGER ID NUMBER: 7190  DEPTH OF WATER IN WELL: 13.69  DATA  TOTAL DEPTH OF WELL: 13.69  DEPTH OF WATER IN WELL: 11.67  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 17  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: 12:  DATA  SEGMENT NUMBER OF INTERVAL DUPATION TIME (SEC.) (SEC.) (SEC.)  SEC.) (SEC.)  SEC.) (SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC.)  SEC	SCIARTISTS	71 023			1:156	LA	
TOTAL DEPTH OF WELL:  VELL DRILLED BY:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL:  DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WELL: DEPTH OF WATER IN WATER IN WELL: DEPTH O	TOTAL DEPTH OF WELL:    13		26.023					
DEPTH OF WATER IN WELL: 11. L-77  MATE TEST PERFORMED: 12-14-90  INITIAL TRANSDUCER WATER LEVEL:  STATIC TRANSDUCER WATER LEVEL: 6.01  DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 2" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DIAMETER OF PIPE: 3" 1 7  DI	DEPTH OF WATER IN WELL: 11. L'7  DATE TEST PERFORMED: 12.14.90  INITIAL TRANSDUCER WATER LEVEL:  STATIC TRANSDUCER WATER LEVEL:  DIAMETER OF PIPE: 2" 1 1  DIAMETER OF PIPE: 2" 1 1  SCREEN LENGTH: EFFECTIVE SCREEN LENGTH: 1:  STATIC WATER LEVEL (T.C.P.):  DATE TEST (circle)	SITE: HINCO		LOG	GER ID NUMBI	ER:	9021	<del></del>
DEPTH OF WATER IN WELL: 1.67  MATE TEST PERFORMED: 12-19-90  INITIAL TRANSDUCER WATER LEVEL: 6.0/  DOP OF PIPE ELEVATION: DIAMETER OF BOREHOLE: DIAMETER OF BOREHOLE: DIAMETER OF PIPE: 3" 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	DEPTH OF WATER IN WELL: 11.67  DATE TEST PERFORMED: 12-14-90  STATIC TRANSDUCER WATER LEVEL: 6.01  DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF BORRHOLE: DIAMETER OF	CLIENT: U.S. 8	PA	<b>TO</b> T	AL DEPTH OF V	WELL:	1.69	
ATE TEST PERFORMED: 12-19-90  INITIAL TRANSDUCER WATER LEVEL: 6,0/  DATE TEST PERFORMED: 200 STATIC TRANSDUCER WATER LEVEL: 6,0/  DAMETER OF BOREHOLE: DIAMETER OF BOREHOLE: DIAMETER OF PIPE: 2" 1 7  BALL/RISE TEST (circle)	DATE TEST PERFORMED: 12-19-90  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDUCER WATER LEVEL: 6, 0/-  INITIAL TRANSDU	WELL DRILLED BY:		DEP	TH OF WATER	IN WELL:	1.677	
DAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"  DIAMETER OF PIPE: 2" 1"	DIAMETER OF BOREHOLE:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 3" 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	DATE TEST PERFORMED:	12-14-90	INIT	IAL TRANSDUC	ER WATER LEV	EL:	
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NUMBER   READINGS   (SEC.)   SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)   (SEC.)	1   50   0,2   10   10   10   15   15   15   15   15	Logger	Protective Casing	SEGMENT	NUMBER OF	INTERVAL		
1   50   0,2   10   10   10   2   1/3   1   1/3   1/3   3   1/3   3   1/3   3   3   3   3   3   3   3   3   3	1   50   0,2   10   10   10   2   13   3   3   5   75   75   75   4   15   30   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   450   45		2" PVC Casing					
3   15   5   75   75     4   15   30   450   450     5   150   0.2   10   10     22   15   1   15   15     Transducer   Stainless Steel Slug   10   11     Bentonite Seal   12   13     Well Screen   15   16     L' length is less than the sand pack length if   PRESSURE TRANSDUCER PSi: 15	Rressure Transducer  Water Level Stainless Steel Slug  Bentonite Seal  Well Screen  15  PRESSURE TRANSDUCER PSI:  Well Screen  STAINLESS STEEL SLUG LENGTH:  "L" length is less than the sand pack, where "L"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  "Y"  "Y"  "Y"  "Y"  "Y"  "Y"  "	<i>\$\$\$\$\$\$\$\$\$\$\$\$</i>	ALL HILLIAM	1	50	0,2		· · · · · · · · · · · · · · · · · · ·
### A 15 30 450 450  ### A 15 30 450 450  #### A 15 30 450 450  #### A 15 30 450 450  ###################################	Pressure  Water Level  Stainless Steel Slug  Bentonite Seal  Well Screen  Well Screen  Well Screen  To where "L" length is less than the sand pack length if le water table intersects sand pack, where "L" stainless STEEL SLUG LENGTH:  You water table and	! []		2	15	1		15
### Stainless Steel Slug	Pressure Transducer  Water Level Stainless Steel Slug  Bentonite Seal  Well Screen  Well Screen  Te'l' length is less than the sand pack length if le water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  STAINLESS STEEL SLUG LENGTH:  "Y"  "Y"  "Y"  "Y"  "Y"  "Y"  "Y"  "	; [] [		3	15	5		
Pressure Transducer  Stainless Steel Slug  Bentonite Seal  Silica Sand  Well Screen  15  17  15  16  PRESSURE TRANSDUCER PSI:  10  10  10  11  11  11  11  11  11  1	Pressure  Water Level  Stainless Steel Slug  Bentonite Seal  Solica Sand  Well Screen  Well Screen  Tenstoner Level  Stainless Steel Slug  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  STAINLESS STEEL SLUG LENGTH:  Well Screen  ST	: []			15	30	450	450
Pressure  Water Level  Stainless Steel Slug  Bentonite Seal  Well Screen  15  16  PRESSURE TRANSDUCER PSI:	Pressure Transducer  Stainless Steel Slug  Bentonite Seal  Silica Sand  Well Screen  Well Screen  The water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH:  Water Level  8 3 / 5 75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  16 75 75  16 75 75  75 75  75 75  75 75  75 75  75 75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75 75  75			<del></del>		0.2	- 10	
## Water Level	Pressure Transducer  Stainless Steel Slug  Bentonik Seal  Silica Sand  Well Screen  "L" length is less than the sand pack length if ne water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH: 4'  STAINLESS STEEL SLUG LENGTH: 4'		}			0:2	10	<u> 10</u>
Stainless Steel Slug  Stainless Steel Slug  10  11  Bentonite Seal  12  Silica Sand  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI:	Stainless Steel Slug  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  15  16  PRESSURE TRANSDUCER PSI:  16  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  STAINLESS STEEL SLUG LENGTH:  ST		V silak a / s s s l		<del>                                     </del>	<del>/</del>		75
Stainless Steel Slug  10  11  Bentanite Seal  12  Silica Sand  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI:  15  16	Stainless Steel Slug  Bentonite Seal  12  13  14  15  16  PRESSURE TRANSDUCER PSI:  18  19  19  10  11  10  11  11  11  12  13  14  15  16  PRESSURE TRANSDUCER PSI:  15  16  STAINLESS STEEL SLUG LENGTH:  17  18  19  10  11  11  12  13  14  15  16  17  18  19  18  18  18  19  19  19  19  10  11  11  11  12  13  14  14  15  16  17  18  18  18  18  18  19  19  19  19  19		1 -			30	450	
Bentonite Seal    12     13   14     15   16     16     16	Bentonik Seal    12     13     14     15     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16     16	Transoucer 1	Stainless Steel Slug					
Well Screen 15  16  L' length is less than the sand pack length if PRESSURE TRANSDUCER PSI:	Silica Sand  13  14  15  16  PRESSURE TRANSDUCER PSI:  Well Screen  15  16  PRESSURE TRANSDUCER PSI:  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  STAINLESS STEEL SLUG LENGTH:  "L"  "L"  "L"  "L"  "L"  "L"  "L"  "			11				
Well Screen 14 15 16  L* length is less than the sand pack length if PRESSURE TRANSDUCER PSI:	Well Screen  14  15  16  PRESSURE TRANSDUCER PSI:		Bentonite Seal	12				<del> , -, ,</del>
Well Screen 15 16 L' length is less than the sand pack length if PRESSURE TRANSDUCER PSI:	"L" length is less than the sand pack length if ne water table intersects sand pack, where "L" STAINLESS STEEL SLUG LENGTH:	↑ A	Silica Sand	<del></del>				
L* length is less than the sand pack length if PRESSURE TRANSDUCER PSI:	"L" length is less than the sand pack length if ne water table intersects sand pack, where "L" sTAINLESS STEEL SLUG LENGTH: 4'	٤ ا	1/41 50000					
L* length is less than the sand pack length if PRESSURE TRANSDUCER PSI:	"L" length is less than the sand pack length if ne water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH: 4'  STAINLESS STEEL SLUG LENGTH: 4'		Well Screek					
a contact tale la intersecte constitue a la coloculare #1 #	ne water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH: 4	" length is less than the s	and nack length if		PANSDIICER PS	st 15		
	ill adriatica permaati marai rapia and	e water table intersects sa	nd pack, where "L"				<del> <u>i</u></del>	
iii adriat cistatica patwaati watai sabia arid	ottorn or sand pack.		water table and	31AINEE33 31	LEE OLDG LE.		······································	
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EST PERFORMED BY: T Koach DATE: 12-14-90 DGGER DOWNLOADED BY: T Koach DATE: 12-14-90	EST PERFORMED BY: T Kouch DATE: 12-14-90  OGGER DOWNLOADED BY: T Kouch DATE: 12-14-90	ALOUR ATIONS THE		DATE				1

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PROJECT NO.: ZOC 26 023  SITE: HIMCO  CLIENT: EPA  CLIENT: EPA  TOTAL DEPTH OF WELL: 19.55'  DEPTH OF WATER IN WELL: 9.28'  INITIAL TRANSDUCER WATER LEVEL:  TIME TEST PERFORMED: 10.00  STATIC TRANSDUCER WATER LEVEL: 7.98'  TOP OF PIPE ELEVATION.  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: Z''  SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DATE TEST (circle)  BOTO  STATIC WATER LEVEL (T.C.P.):  DATE TEST (circle)  SOTION  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: SCREEN LENGTH: 1.1:  DATE TO DE PIPE: S	DOMONUE ENGINEERS ARCHITECTS SCIENTISTS	INFIELD HYD	RAULIC SLUG TE		CTIVITY	SHEET _/	OF _/_
CLIENT: EPA  CLIENT: EPA  TOTAL DEPTH OF WELL: 19.55  WELL DRILLED BY: MATHES  DATE TEST PERFORMED: 12-1-90  INITIAL TRANSDUCER WATER LEVEL:  TIME TEST PERFORMED: 16.00  STATIC TRANSDUCER WATER LEVEL: 7.98  TOP OF PIPE ELEVATION:  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2 "  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH:  STATIC WATER LEVEL (T.C.P.):  DATE  LOGGER ID NUMBER: 71902  TOTAL DEPTH OF WELL: 19.55  DEPTH OF WELL: 19.55  DEPTH OF WELL: 19.26  INITIAL TRANSDUCER WATER LEVEL: 7.98  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2 "  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: "L":  DATE  LOGGER ID NUMBER: 7190  DEPTH OF WELL: 19.26  INITIAL TRANSDUCER WATER LEVEL: 7.98  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2 "  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: "L":  DATE  LOGGER ID NUMBER: 7190  INITIAL TRANSDUCER WATER LEVEL: 7.98  DIAMETER OF BOREHOLE:  DIAMETER OF PIPE: 2 "  SCREEN LENGTH:  EFFECTIVE SCREEN LENGTH: "L":  DATE  SEGMENT NUMBER OF INTERVAL SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.) (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT NUMBER OF INTERVAL (SEC.)  SEGMENT	PROJECT NO.: 200'24	0.023	WEL	L NUMBER:	WTIO	5:A	
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DATE TEST PERFORMED: 12-1-90  INITIAL TRANSDUCER WATER LEVEL: 7.98  TOP OF PIPE ELEVATION: DIAMETER OF BOREHOLE: DIAMETER OF PIPE: Z "  SCREEN LENGTH: SCREENED IN: STATIC WATER LEVEL (T.C.P.):  DATE TEST PERFORMED: 16 00  STATIC TRANSDUCER WATER LEVEL: 7.98  DIAMETER OF BOREHOLE: DIAMETER OF PIPE: Z "  SCREEN LENGTH: EFFECTIVE SCREEN LENGTH: "L": STATIC WATER LEVEL (T.C.P.):  DATE TEST PERFORMED: 16 00  DAMETER OF PIPE: Z "  SCREEN LENGTH: "L": SEGMENT NUMBER OF INTERVAL (SEC.) DURATION (SEC.) SEC.) SEGMENT NUMBER READINGS (SEC.) TIME (SEC.) SEC.) SEGMENT NUMBER OF INTERVAL (SEC.) SEC.) SEC. SEC. SEC. SEC. SEC. SEC. SEC. SEC.		1.					
TIME TEST PERFORMED: 16 00 STATIC TRANSDUCER WATER LEVEL: 7.98 '  TOP OF PIPE ELEVATION: DIAMETER OF BOREHOLE:  BESERVATION WELL PIEZOMETER (circle): DIAMETER OF PIPE: Z "  SCREEN LENGTH: EFFECTIVE SCREEN LENGTH* "L":  STATIC WATER LEVEL (T.C.P.):  Data	WELL DRILLED BY: MA	thes					
TOP OF PIPE ELEVATION:  BSERVATION WELL PIEZOMETER (circle):  BOTH  SCREEN LENGTH:  FORMATION WELL SCREENED IN:  STATIC WATER LEVEL (T.C.P.):  Data  Logger  Fritchive Casing  2" PVC Casing  NUMBER READINGS  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 55 0 0 2 /0 /0  1 55 0 0 2 /0 /0  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 50 0 2 /0 /0  1 50 0 2 /0 /0  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 15 0 0 2 /0 /0  1 15 0 0 2 /0 /0  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			INITI	AL TRANSDUC	ER WATER LEV	EL:	<del>~ / -</del>
TOP OF PIPE ELEVATION:  BSERVATION WELL PIEZOMETER (circle):  BOTH  SCREEN LENGTH:  FORMATION WELL SCREENED IN:  STATIC WATER LEVEL (T.C.P.):  Data  Logger  Fritchive Casing  2" PVC Casing  NUMBER READINGS  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 55 0 0 2 /0 /0  1 55 0 0 2 /0 /0  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 50 0 2 /0 /0  1 50 0 2 /0 /0  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  SEGMENT NUMBER OF NITERVAL (SEC.)  1 50 0 2 /0 /0  1 15 0 0 2 /0 /0  1 15 0 0 2 /0 /0  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<del></del>		_ STA	TIC TRANSDUC	ER WATER LEV	/EL: 7, 9,	8
FALL/RISE TEST (circle)  SCREEN LENGTH:  FORMATION WELL SCREENED IN:  STATIC WATER LEVEL (T.C.P.):  Data  Logger  Protective Casing  2" PVC Casing  NUMBER OF INTERVAL DURATION TIME (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (SEC.)  (			DIAN	METER OF BOR	EHOLE:		
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Pressure  Transducer  Water Level  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI: 15  will equal distance between water table and  15  TAINLESS STEEL SLUG LENGTH: 4/		AND HEADERS	1	50	0.2		· · · · · · · · · · · · · · · · · · ·
Pressure Transducer  Stainless Steel Slug  Bentonite Seal  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI:  15  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  STAINLESS STEEL SLUG LENGTH:  Y  **L**  STAINLESS STEEL SLUG LENGTH:  **L**  **L**  **L**  **STAINLESS STEEL SLUG LENGTH:  **L**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **J**  **			2	15	1	15	
Pressure  Transducer  Stainless Steel Slug  Bentonite Seal  Silica Sand  11  Well Screen  15  16  PRESSURE TRANSDUCER PSI:  Will equal distance between water table and  STAINLESS STEEL SLUG LENGTH:  The water table intersects sand pack, where "L"  STAINLESS STEEL SLUG LENGTH:	: 1111	i	3	/5	2	30	
Pressure Transducer  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI: 15  will equal distance between water table and  15  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47	!	<u></u>					
Pressure Transducer  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI: 15  will equal distance between water table and  Tansducer  Stainless Steel Slug  10  11  PRESSURE TRANSDUCER PSI: 15  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG LENGTH: 47  STAINLESS STEEL SLUG							
Pressure Transducer  Stainless Steel Slug  Stainless Steel Slug  10  11  Bentonite Seal  12  13  14  Well Screen  15  16  PRESSURE TRANSDUCER PSI: 15  he water table intersects sand pack, where "L"  will equal distance between water table and	111						
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Bentonite Seal  10  11  Bentonite Seal  12  13  14  14  15  16  PRESSURE TRANSDUCER PSI: 15  he water table intersects sand pack, where "L" standard distance between water table and		-	9				
Bentonite Seal    12	Transoucer T	, Stainless Steel Slug	10				
Silica Sand  13  14  15  16  PRESSURE TRANSDUCER PSI: /5  will equal distance between water table and  13  14  15  16  PRESSURE TRANSDUCER PSI: /5  STAINLESS STEEL SLUG LENGTH: 4/		a. h. it coal					
Well Screen  15  16  PRESSURE TRANSDUCER PSI:							
Well Screen  15  16  PRESSURE TRANSDUCER PSI: 15  He water table intersects sand pack, where "L" will equal distance between water table and		> Silica Sand					
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TECHNICAL MEMORANDUM NUMBER 12

ORGAL

DATE: February 17, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager

Mike Crosser, TSQAM

FROM: Marcia A. Kuehl

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024 Himco Dump Site, Elkhart, Indiana

Waste Mass Gas Sampling

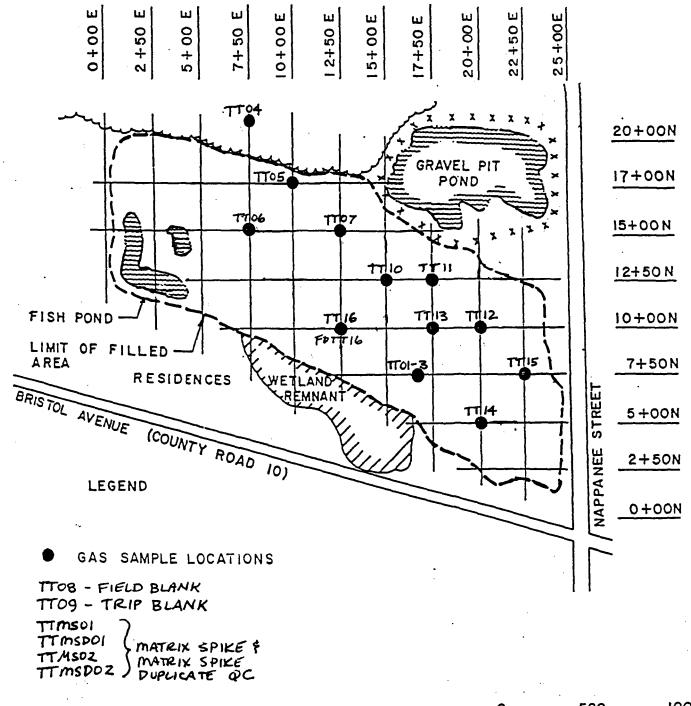
This technical memorandum presents the waste mass gas sampling method and the analytical results from three initial samples which were used to establish sample collection times and pump rates.

Introduction

Characterization of the Himco Dump Site waste mass gas was necessary to select appropriate remedial alternatives and develop the risk assessment. Typical municipal landfill gas consists primarily of of methane, carbon dioxide, and a small amount of hydrogen sulfide. If volatile organic solvents have been disposed in the landfill, the gas will also contain volatile organic compounds (VOCs). Historical site groundwater data indicates the presence of acetone, trans-1,2-dichloroethene, chloroethane, chlorofluoromethane, and dichlorodifluoromethane in shallow groundwater. No historical waste mass gas or ambient air data exists for the site. Accordingly, samples were collected and analyzed for the EPA Target Compound List VOCs and up to 10 tentatively identified VOCs.

Twelve cap soil sampling locations, as shown in Figure 1, were selected for waste mass gas collection. These locations were chosen based on the highest field VOC readings, as measured by the HNu, or where the highest methane or hydrogen sulfide ambient concentrations, as measured by the Lumidor Gasponder IV meter, were noted in the 0- to 18-inch soil sample headspace.

Two sampling events were conducted. On November 7, 1990, three samples were collected at location G-20 by Marcia Kuehl and Dorothea Downs (Ebasco) in order to establish pump rates and sample collection times. The collection time and pump rate must be sufficient to collect enough sample volume for analysis yet not saturate the Tenax® adsorbent. On November 13 and 14, 1990, the remaining locations were sampled by Marcia Kuehl, Tom Puchalski, and Dorothea Downs. One trip blank, one field blank, one field duplicate, two matrix spikes, and two matrix spike duplicates were also collected on November 13 and 14, 1990, for a total of 18 samples sent for analysis.



SOURCE: US EPA, AUGUST, 1986

0 500 1000

SCALE: FEET
SCALE IS APPROXIMATE

Donohue

WASTE GAS SAMPLING LOCATIONS



20026

1990

FIELD SAMPLING PLAN HIMCO DUMP SITE ELKHART, INDIANA

FIGURE

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Engineers • Architects • Scientists

Methods

The following equipment and materials were used during the waste mass gas sampling:

- Lumidor Gasponder IV Model PGM-14 (for measurement of methane and hydrogen sulfide).
- Hollow perforated nickel plated alloy steel soil probe, 10 feet maximum length x 5/8 inch OD.
- 3. KVA Macho portable soil gas probe system.
- 4. Gilian Gilair peristaltic sampling pump.
- 5. Digital soap bubble flow meter EZ Cal Sensidyne.
- 6. HNu photoionization detector.
- 7. Stop watch.
- 8. Teflon tubing.
- 9. Tenax/charcoal sorbent tubes (supplied by CLP SAS lab).
- 10. Tenax sorbent tubes (supplied by CLP SAS lab).
- 11. Culture tubes (supplied by CLP SAS lab).
- 12. Friction-top can with charcoal for packaging.
- 13. Freezer.
- 14. Water, deionized and tap.
- 15. Isopropanol (A.C.S.).
- 16. Five-gallon pail with cover to contain isopropanol rinses.
- 17. Liquinox soap.
- 18. Brushes.
- 19. EPA Region V sample tags and SMO traffic report labels.
- 20. Plastic bags.
- 21. Camera and film.
- 22. Polyester gloves.
- 23. Generator (20 amp, 120 volt), gas powered.

The local weather station was called each morning prior to sample collection to get the current temperature, wind speed and direction, humidity, and barometric pressure. Sampling was done when winds were below 10 mph and no rain or snow was present. High winds disperse vapors emanating from the borehole, and moisture in the tenax and charcoal sorbents interfere with the chemical analysis.

The pump and a dummy sorbent tube assembly was calibrated daily prior to sample collection with the EZ Cal Sensidyne digital soap bubble flow meter using seven readings. Multiple readings are recommended by the flow meter calibrator manufacturer due to the inherent variability of the bubbles generated. The mean value of readings was used as the actual pump rate because the pump rotameter reading scale was not readable to within 0.10 liters/minute.

The KVA Macho® System 13-pound air rotary hammer, powered by a gas powered generator, was used to drive the stainless steel probe into the ground. A 3-foot sampling interval was attempted at each location. Gas inlets were at the bottom 3 inches of the probe. Refusal occurred prior to 3 feet at some locations due to the presence of waste and/or compacted calcium sulfate. The borehole with the probe inserted was allowed to equilibriate for 15 minutes prior to sample collection.

The SAS laboratory prepared and preanalyzed the sorbent tubes prior to sample collection. Results of the analysis are contained in Attachment A. Acceptable levels of volatile organics with boiling points less than 110°C (acetone, benzene, hexane, tetrachloroethylene, and toluene) were reported. Amounts detected were 0.4 to 12.9 ng per pair of tubes which was not of sufficient magnitude to prevent accurate determination of the sample components expected. It should be noted that the compound levels reported for the preanalysis verify that the sorbent tubes are purged of these compounds and are considered "clean" for subsequent sample collection.

The sorbent tubes were contained in sealed culture tubes, removed from the freezer, and opened only just before actual sample collection. The sorbent tubes were handled with polyester-gloved hands and did not contact any other surfaces. It was important to keep the sorbent tubes themselves free from fingerprints and dust as the tubes are placed directly in the desorption unit for analysis at the lab.

Figure 2 presents the sampling train used in the field. Teflon tubing was connected from the probe nipple to the end of the sorbent tube assembly. The sorbent tube assembly consisted of the tenax tube and then the tenax/charcoal tube connected in series using teflon ferrules and stainless steel Swagelok fittings. The tube assembly was connected to the Gilian/Gilair precalibrated pump using teflon tubing.

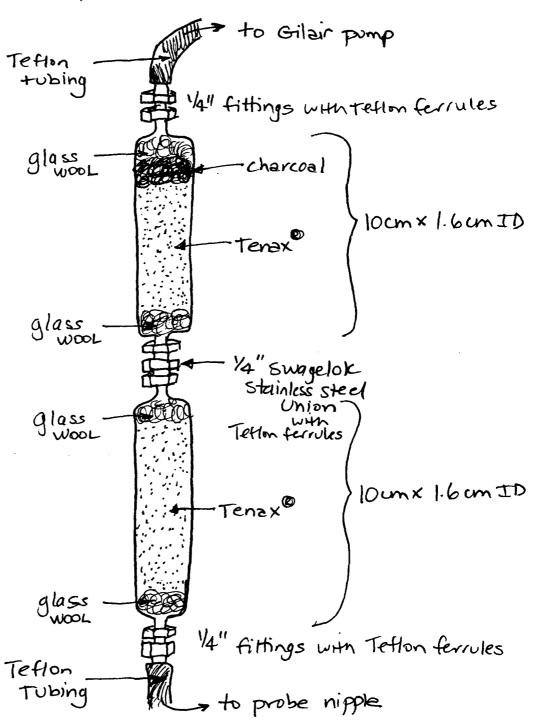
After the pump was started, the start time, rotameter reading, sorbent tube numbers, and collection conditions were recorded on the Soil Gas Survey Form (Attachment B). At the end of the sampling period, the flow rate was checked using the rotameter and recorded on the Soil Gas Survey Form (Attachment B). The flows at the beginning and end of all sampling periods did not vary by more than 10 percent, so all tubes used were considered valid samples. The end time was then recorded, and the sorbent tube assembly disconnected with polyester-gloved hands, replaced in the culture tubes, and the tubes labeled with EPA tags and SAS labels. The culture tubes were sealed in a paint can containing a layer of charcoal on the bottom and packaged with ice for next day shipment to IT Corporation laboratory, Cincinnati, Ohio.

Decontamination of the steel soil probe was done between borings using liquinox and tap water wash, followed by a tap water rinse, an isopropanol rinse, and two rinses with deionized water. The sampling pump was decontaminated by pumping several liters of ambient air through it. Decontamination rinses containing isopropanol were containerized for eventual discharge to the municipal wastewater treatment system.

FIGURE 2

SAMPLING TRAIN HIMCO DUMP

I/I DESIGN



The total volumetric flow for each cartridge was calculated and recorded on the Soil Gas Survey Form using the following equation:

$$V_{m} = \frac{T \times Q_{A}}{1000}$$

where:

 V_{m} = Total volume sampled in liters at measured temperature and pressure

QA = Flow rate in ml/minute

 $T = Sampling time = T_2 - T_1$, minutes

 T_2 = Stop time

 $T_1 = Start time$

The total volume (V_S) at standard conditions, 25°C and 760 mmHg, was then calculated from the following equation and included on the chain-of-custody form so the lab could report results in ng/l.

$$V_S = V_m \times P_A \times 298$$

760 273 + t_A

where:

 P_A = Average barometric pressure, mmHg t_A = Average ambient temperature, °C

Summary of Results

Samples as listed in Table TM12-1 were collected. Field trial sample analytical results are in Attachment C and detected compounds are summarized in Table TM12-2. No Time Weighted Averages (TWA) were exceeded.

Compounds detected were 1,1,2-trichloro-, 1,2,2-trifluoroethane, methylene chloride, acetone, benzene, toluene, 1,1,1-trichloroethane, and carbon disulfide.

<u>Deviations</u>

The following deviations from the Field Sampling Plan occurred, but were not judged by the Site QC officer and Site Manager as negatively impacting data quality:

 Borehole equilibration was done for 15 minutes rather than the 5 minutes specified in the FSP. The time was extended after evaluation of the data collected on November 7, 1990, which indicated that the greatest concentration of 1,1,2-trichloro - 1,2,2-trifluoroethane was measured in the sample collected after the borehole was open for 15 minutes.

- 2. The initial sampling rate specified in the FSP was 1 liter/min for 20 minutes. Based on conversations with other ARCS contractors familiar with use of the VOST sorbent tube assembly for gas sampling and the analytical laboratory, a rate of approximately 4 liters/minute was selected. Sampling times of 16.87 minutes, 12.18 minutes, and 5.00 minutes were used on November 7, 1990, during the field trial. Based on these results, a sample volume (V_S) of approximately 2 liters was selected using a pump flow rate of approximately 4 liters/minute for 10 minutes, and the borehole was left open to equilibriate for 15 minutes after probe insertion. Remaining samples, HDTT04-HDTT07, HDTT10-HHFDTT16, were collected using these operating parameters.
- 3. The FSP indicated that two sampling locations were to be sampled during the field trial. Only one location was sampled as the weather was threatening, and rain was expected.
- 4. The Corporate Health and Safety Manager reviewed the sampling and documentation during the initial field trial.
- 5. A bottle blank, as specified by the FSP, was not collected. A field blank consisting of a pair of sorbent tubes uncapped and exposed to site ambient air for the sampling period (10 minutes) was collected based on advice from the CLP laboratory and other ARCS contractors.
- 6. Two sets of matrix spike and matrix spike duplicate sorbent tubes were collected and consisted of four sets of unexposed tubes. These samples were added as the SAS method specified this QC requirement at a frequency of 1 per 10 field samples.
- 7. Refusal occurred during sampling due to the 3-foot sample interval could not be achieved for all samples, as indicated in Table TM12-1.

A/R/HIMCO/AA5

TABLE TM12-1

VOLATILE MASS GAS SAMPLES COLLECTED Himco Dump Site Elkhart, Indiana

Grid Point Location	Borehole equil. time (min.)	Sample Number	Sample Depth (ft.)	Mean Pump Flow Rate _L/min.	Sample Time (min.)	Total Volumetric Flow (V _m) (liters)
G-20	5	HD-TT01	0.75	4.21	16.87	71.0
G-20	17	HD-TT02	0.75	4.21	12.18	51.3
G-20	30	HD-TT03	0.75	4.21	5.00	21.0
OFF-SITE	15	HD-TT04	3.0	4.17	10.00	41.7
R-12	15	HD-TT05	2.4	4.17	10.00	41.7
Q-8	15	HD-TT06	2.7	4.17	10.00	41.7
0-15	15	HD-TT07	3.0	4.17	10.00	41.7
FIELD BLANK		HD-FBTT08	0		10.00	
TRIP BLANK		HD-TBTT09				· -
L-18	15	HD-TT10	2.0	4.17	10.00	41.7
L-21	15	HD-TT11	2.6	4.17	10.00	41.7
I-22	15	HD-TT12	3.0	4.17	10.00	41.7
D-24	15	HD-TT14	3.0	4.17	10.00	41.7
F-25	15	HD-TT15	3.0	4.17	10.00	41.7
K-14	15	HD-TT16	3.0	4.17	10.00	41.7
K-14	15	HD-FDTT16	3.0	4.17	10.00	41.7
Matrix Spike		HD-TTMS01				
Matrix Spike		HD-TTMS02				
Matrix Spike Duplicate		HD-TTMSD01				
Matrix Spike Duplicate		HD-TTMSD02	- ~	~ ~		

A/R/HIMCO/AA5

TABLE TM12-2

WASTE MASS GAS FIELD TRIAL ANALYTICAL RESULTS Himco Dump Site Elkhart, Indiana

Detected Volatile Organic	HD-TT01 ng/L	HD-TT02	HD-TT03	TWA ng/L
Methylene Chloride	2.66 B	7.83 B	14.6	350,000
Acetone	5.31	8.29	17.9	1,780,000
Benzene	0.66 J	1.84	2.25	30,000
Toluene	23.9	30.9	21.3	375,000
1,1,2-Trichloroethane-	19.9	138	225	NE
1,2,2-Trifluoroethane				
Unknown Hydrocarbon (RT 11.26)	3.32	9.22	ND	NE
Carbon Disulfide	ND	3.22	ND	30,000
1,1,1-Trichloroethane	ND	2.30	ND	1,900,000
Unknown Hydrocarbon (RT 16.22)	ND	3.69	ND	NE

Legend:

- B Detected in unexposed lab blank tubes.
- J Estimated concentration, below detection limit.
- ND Not detected.
- RT Retention Time, in units.
- TWA = Time Weighted Average for normal 8-hour workday. and a 40-hour workweek.
- NE = Not Established.

A/R/HIMCO/AA5

ATTACHMENT A

VOST BLANK CHECK RESULTS



VOST Blank Check Results

ITAS Cincinnati

Client I.D. USEPA -VIAR

W.O. # X0-10-293

Date	Analyst	Tube No.s	Batch	Acetone	Benzene	Hexane	Perc	Toluene	DONOHUE #	SITE		Unknown (1)	Can No.
10/24	VR	14161 10 1555	301		1.3		9.0	0.8	TT/0	L-18		<5ng	(
i		13262 TC 35		3,3	1.9	1.0	12.0	0.7	TT 12	I-22			
		T14 TCX 4241		6.0	3.9	0.5	11.4	0.9	TT 09	TB			
		160 TC 4640		4.5	2.2	1,3	12.9		1108	FB	Tube say	1	
		11-100 TC47		5.3	3.0	1.1	10.0	0.9.	1105	R-12			
4		T2154 Tc4602		6.1	2.1	1.5	7.7	0,6	TT 04	anira	ļ		
10/26		T9721 Tc4752			0.8								
		14488:Tc4741		1.4	1.9	1.3	4.2	0.7	1106	0.8			
		T4211 TC4754		7.3	2.3	4.0	8.2	0.9	TIL	L-21	ļ		
		T3907 TC 4744		1.0	1.3	1.4	4.5		TT07	0-15			-
<u> </u>		T4717 164484		2.6	1.3	1,6	3,0		4501				2
	<u> </u>	14673 TC 9739				0.5	3.7	0.4	M5001			 	1-1
		T4694 TC4141		1.1_	0.9	0.8	0.8	0.5	45002				
		14121 Tu 4126		2.5	1.5	0.9		<u> </u>	11/16	F-14		 	<u> </u>
		T4698TC4742			1.4	1.2		0.6	FOTT16	F-14	ļ		
		T4713 TC4748		2.6	110	1.2		0.4	 			 	
47		T4716 TC4648		618	2.2	0,6	9.7	0.5	T14	D-24			
10/28	ļ	T4715 TO 3148		8.8	3.3	0.6			MSUZ				
		T42 Tc3182		6.0	1.9	1.1		0.5	TT 15	F-25			
		T4670:TL4538		5,1	1.4	2,4				<u> </u>			-
4	-	T4723763619		7.6	1.5	0.8		0.6	1T 13	I-21		47	-
					******				* *****				

⁽¹⁾ based on benzene response factor for the largest unknown peak in run. All targets are listed as NG per pair.



VOST Blank Check Results

ITAS Cincinnati

Client I.D. USEPA - VIAR

W.O. # XO-10-293

······································											1 1/2		
Date	Analyst	Tube No.s	Batch	Acetone	Benzene	Hexane	Perc	Toluene	EP4 ID	DONOTHE IV	Literat	Unknown (1)	Can No.
1031	URIMM	T 4629Tc4490	305	0.6	1.0	1.3		0.6	TTOI	6-20	70.93	45ing	1
i		73845 TC2315 T2044TC 3366		1.4	1.7	2.0	33	0.9	used to pumps 2049-us	Calibrate MALL!	14/90		
		T20991C 3366		0.7	1.3	1.7		0.8	L		I _		
		T4131 TC438		10	1.3	1.3	2,5	0.6	TT03	6-20		m	
. 1		T2322 TC4475		0.8	1.5	2.2	2.8	0.8	TT02	620	57.38		
11	1	T448-3TC 3989	4		0.5	0.5		1.1	extra			V	\checkmark
,-												** ***	
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M-3001-A-L-8/90-4

(1) based on benzene response factor for the largest unknown peak in run. All targets are listed as NG per pair. Yuncorrected to STD Conditional (Vm)

ATTACHMENT B

SOIL GAS SURVEY FORMS



SOIL GAS SURVEY FORM

CLIENT: <u>EPA ANCS</u> DATE: <u>III 7190</u> EPA SAS NO.: <u>5798</u> E-1/E-2 SITE: <u>HOMO</u> DONOHUE SPL NO.: <u>HD ITO 1</u> PROJECT NO.: <u>20026</u> SAMPLING TEAM: <u>Marcia Kuehl</u> , Dorothea Downs
SAMPLING CONDITIONS Gastch Gx86 (al 11/18) TEMPERATURE: 40 of $-32 \times 5/9 = 4.4$ oc (ta) BAROMETRIC PRESSURE (PA): 30.05 mm Hg at 0800 (AN/PM RELATIVE HUMIDITY: 92 % WEATHER: 10 mph from 10 mph f
SAMPLE GRID COORDINATES: N E Grid point G-20 near SAMPLING INTERVAL: 18-24" Ar SOIL CONDITIONS AT SURFACE: wet, moss growing on soil
PUMP MFG/MODEL/SN: Gilian EN 2961 (Gilain) Cal readings 4.201 4.218 4/m. 4.201 4.218 4/m. Calibrator MFG/MODEL/SN: E2 (all/sensidyne /25/222 4.218 4.201
SAMPLE COLLECTION TENAX S CHARCOAL TUBE NUMBER: TC 4490 E-1 CHARCOAL TENAX TUBE NUMBER: T4629 E-2 STOP TIME: 11:53:52 COLLECTION CONDITIONS: (3 ining ~ 3" START TIME: 11:37:00 Afficial sayate TIME ELAPSED (T) 16:51 xc MINUTES TOTAL VOLUMETRIC FLOW CALCULATION 4.21 71.02 Vm = T x QA = 16:27 x 4:306 = 70.55 LITERS (Vm)

*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

1	
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1	ARCHITECTS
	SCIENTISTS

SOIL GAS SURVEY FORM

CLIENT: <u>EPA ANCS</u> DATE: 11/7/90 EPA SAS NO.: 5798E-3/E-4
SITE: Home DONOHUE SPL NO.: HD7T02
PROJECT NO.: 20026,
SAMPLING TEAM: Marcia Kuehl Dorothia Downs
SAMPLING CONDITIONS Set 11/7/90,
TEMPERATURE:°F - 32 x 5/9 = °C (ta)
BAROMETRIC PRESSURE (PA): mm Hg at AM/PM H2S:ppm
RELATIVE HUMIDITY:% CH4:% LEL
WIND: mph from
WEATHER:
SAMPLE GRID COORDINATES: N E Same bore had as Sampling interval: tr
SOIL CONDITIONS AT SURFACE:
GOLZ GONDITIONS AT GOTH ACE.
PUMP CALIBRATION 5:45 11/7/65 1
PUMP CALIBRATION SEE 11/7/90 1 PUMP MFG/MODEL/SN:
CALIBRATOR MFG/MODEL/SN:
INITIAL CALIBRATION (QA) TO L/MIN AT TIME:
CALIBRATION VERIFICATION: ROTAMETER READING TIME:
IF > 10%, SAMPLE ROTAMETER READING TIME: TUBES SUSPECT, RESAMPLE % DIFFERENCE
TODES SOST EST, TIESTANT EL % DIFFERENCE
, SAMPLE COLLECTION
CHARCOAL TUBE NUMBER: TC 4475 E 3 CHARCOAL TENAX TUBE NUMBER: T 2322 E-4 STOR TIME: 12:19:25 COLLECTION CONDITIONS:
STOP TIME: 12:07: N COLLECTION CONDITIONS:
TIME ELAPSED (T) 12:11 SC MINUTES
12:13 min
TOTAL VOLUMETRIO EL OVICAL QUILATION
TOTAL VOLUMETRIC FLOW CALCULATION 4.21 57/.28
Vm = T x QA = 12.18 x 4.206 = 57.38 LITERS (Vm)
$Vs = Vm \times PA \times 298 = 2.17 \text{ LITERS (Vs)}^*$
*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

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	ARCHITECTS
	SCIENTISTS

F/SOIL GAS

SOIL GAS SURVEY FORM

	CLIENT: EPA ARCS DATE: 1117/90 EPA SAS NO.: 5748E-5/E-6 SITE: HIMCO DONOHUE SPL NO.: HDTTO3 PROJECT NO.: 20026. SAMPLING TEAM: Maria Kuch Dorother Downs
-	SAMPLING CONDITIONS TEMPERATURE: °F - 32 x 5/9 = °C (ta) BAROMETRIC PRESSURE (Pa): mm Hg at AM/PM RELATIVE HUMIDITY: % WIND: mph from WEATHER:
	SAMPLE GRID COORDINATES.:NE SAMPLING INTERVAL:tt SOIL CONDITIONS AT SURFACE:
•	PUMP MFG/MODEL/SN:
E-5	SAMPLE COLLECTION TENAX + CHARCOAL TUBE NUMBER: $TC. 438$ CHARCOAL TUBE NUMBER: $T. 438$ COLLECTION CONDITIONS: $SCE. 11/7/40 TIO1$ START TIME: $12:23:23$ COLLECTION CONDITIONS: $SCE. 11/7/40 TIO1$ TIME ELAPSED (T) 500 MINUTES
	TOTAL VOLUMETRIC FLOW CALCULATION Vm = T x QA = 5,00 x



SOIL GAS SURVEY FORM



CLIENT: <u>EPA ARCS</u> DATE: 11/13/90 EPA SAS NO.: 5798E E7, E7, E7, E7, E7, E7, E7, E7, E7, E7
SAMPLING CONDITIONS
TEMPERATURE: 25 °F - 32 x 5/9 = °C (tA) HNu: 0 ppm BAROMETRIC PRESSURE (PA): 30.23 mm Hg at $0.7/5$ AM/PM H2S: 0 ppm RELATIVE HUMIDITY: 92 % CH4: 0 % LEL WIND: mph from 1.5 MP M CH4: 0 % LEL WEATHER: 1.5 WE
SAMPLE GRID COORDINATES .: 50' N 26 5-10 E WAR SAMPLING INTERVAL: 3.0 H SOIL CONDITIONS AT SURFACE: fixty, leives moist (in woods)
PUMP CALIBRATION Calump: 4.211 4.028 PUMP MFG/MODEL/SN: Gilian Gilain 1916 PUMP MFG/MODEL/SN: Gilain 1919 (4.00) 4.211 CALIBRATOR MFG/MODEL/SN: EZCAL Sensidy he 1251222 INITIAL CALIBRATION (QA) TO X=4.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 94/Min TIME: 0950 *IF > 10%, SAMPLE ROTAMETER READING 44/min TIME: 0915 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
SAMPLE COLLECTION E-13 TENAX+ E-Turn CHARGOAL/TENAX TUBE NUMBER: 12154 STOP TIME: COLLECTION CONDITIONS: DICHIPLE List Stopwarth START TIME: List Stopwarth TIME ELAPSED (T) 10.00.06 MINUTES T= 2 min

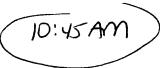
TOTAL VOLUMETRIC FLOW CALCULATION

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.34 \text{ LITERS (Vs)}^*$

*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.



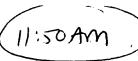
SOIL GAS SURVEY FORM



	CLIENT: EPA ARCS DATE: 11/13/90 EPA SAS NO.: 5793 E
	SITE: Home DONOHUE SPL NO .: TT 65 ET, ETC
	PROJECT NO.: 20026
	SAMPLING TEAM: M KUEN/D Downs / Tom Puchaloku
	SAMPLING CONDITIONS
•	TEMPERATURE: $\frac{2}{3}$ °F - 32 x 5/9 = $\frac{\text{°C (ta)}}{\text{(ta)}}$ HNu: $\frac{0}{3}$ ppm
	BAROMETRIC PRESSURE (PA): 30.23 mm Hg at 0715 AMPM H2S: 0 ppm
.	RELATIVE HUMIDITY: 92 % CH4: 0 % LEL WIND:
	WEATHER: SUNNY
•	
	SAMPLE GRID COORDINATES.:NE R-12
b	SAMPLING INTERVAL: 2'5" 11, refusal
	soil conditions at surface: Visible Casay, sand Hzs odor embient
ē.	PUMP CALIBRATION DEL also TT 04 for Calify PUMP MEG/MODEL/SN: Gilliam / Gillair / 2196
	PUMP MFG/MODEL/SN: Collan / Colair / 2196 CALIBRATOR MFG/MODEL/SN: FZ Cal Sensidyne /251222
	INITIAL CALIBRATION (Qa) TO $X = 4.17$ ($n = 7$) L/MIN AT TIME: 0530
٠	CALIBRATION VERIFICATION: ROTAMETER READING 4.0 4mm TIME: 10:30
į	*IF > 10%, SAMPLE ROTAMETER READING 4.04minTIME: 11:05 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
b	70 DEG GGGT EGT, TEGANIT EL 76 DIFFERENCE
	SAMPLE COLLECTION
• E-14	CHARCOAL TUBE NUMBER: 1047 CHARCOAL/TENAX TUBE NUMBER: 1100
wil	STOP TIME: USE 16:55 COLLECTION CONDITIONS:
•	START TIME: STOPWORTH 10:45 AM VICUUM CAROLES AT T= 2 min
	TIME ELAPSED (T) 10.00 00 MINUTES (2.14 WITH YELLOW 10665 SUBSUFFICE
•	
	TOTAL VOLUMETRIC FLOW CALCULATION
•	$Vm = T \times QA = \frac{10.00}{10.00} \times \frac{4.17}{10.00} = \frac{41.7}{10.00} = \frac{41.7}{10.00} \times \frac{4.17}{10.00} = \frac{41.7}{10.00} = 41.7$

*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.





	E-16, E-17
	CLIENT: EPA ARCS DATE: 11/13/90 EPA SAS NO.: 5798E E-11, E+2
	SITE: DONOHUE SPL NO.: HDTO6
	PROJECT NO.: 20026
	SAMPLING TEAM: M. Kuefl / D. Downs T. Pychalske
•	
	SAMPLING CONDITIONS
#	TEMPERATURE: 25 °F - 32 x 5/9 = °C (ta) HNu: ppm
	BAROMETRIC PRESSURE (PA): 30.23 mm Hg at 0715 AMPM H2S: 0 ppm
	RELATIVE HUMIDITY: 92 % LEL
	WIND: mph from
	WEATHER: SUNDY
	SAMPLE GRID COORDINATES.: N E PB SAMPLING INTERVAL: 2'8" ft
-	SOIL CONDITIONS AT SURFACE:
**	
-	PUMP MFG/MODEL/SN: Gilian / Gilqir /2196 CALIBRATOR MFG/MODEL/SN: E2 Cal / Sensidyne. / 251222 INITIAL CALIBRATION (QA) TO X=Y.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4.0 TIME: 11:32 *IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 11:05 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
	SAMPLE COLLECTION
E-11	TOUAX + CHARCOAL TUBE NUMBER: TC 4741 STOP TIME: START TIME: TIME ELAPSED (T) 10.00.00 MINUTES SAMPLE COLLECTION E-12 CHARCOALTENAX TUBE NUMBER: T 4 488 COLLECTION CONDITIONS: TIME ELAPSED (T) 10.00.00 MINUTES
•	
	TOTAL VOLUMETRIC FLOW CALCULATION

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.84 \text{ LITERS (Vs)}^*$





	CLIENT: EPA ARCS DATE: 11/13/90 EPA SAS NO.: 5798E E18, E119
	SITE: Home DONOHUE SPL NO.: HD TT 07
	PROJECT NO.: 20026
	SAMPLING TEAM: M. Kuehl/ D. Downs/T. Pychalski
	57.411 2116 12141 <u>711 121 121 121 121 121 121 121 121 121 </u>
	SAMPLING CONDITIONS
	TEMPERATURE: °F − 32 x 5/9 = °C (ta) HNu: ppm
	BAROMETRIC PRESSURE (PA): 30.23 mm Hg at 4775 AMPM H2S: ppm
_	RELATIVE HUMIDITY:%
	WIND: mph from
_	WEATHER: SUMMY
	SAMPLE GRID COORDINATES.: N E 0-15
	SAMPLING INTERVAL: 3.6 ft
*	SOIL CONDITIONS AT SURFACE: H25 odor - Intermittent ambient moist, moss
ä	PUMP CALIBRATION GILLO / GILLO / 2196
•	CALIBRATOR MFG/MODEL/SN: EZ (a) 1 Sensidyne 125122
	INITIAL CALIBRATION (QA) TO $\frac{\sqrt{2} - 4.17}{\sqrt{1} - 7}$ L/MIN AT TIME: $\frac{0.0530}{\sqrt{1} - 1}$
٠	CALIBRATION VERIFICATION: ROTAMETER READING
	*IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 15/2
	TUBES SUSPECT, RESAMPLE % DIFFERENCE
•	SAMPLE COLLECTION TENAXS E-19
E-18	CHARCOAL TUBE NUMBER: 10 4744 CHARCOAL/TENAX TUBE NUMBER: 13907
1350	START TIME: Stopwith Collection Conditions:
holer	TIME ELAPSED (T) 10.00.00 MINUTES TOOK HELD Blank at this location
• Of	
	
. ·	TOTAL VOLUMETRIC FLOW CALCULATION
	$Vm = T \times QA = \frac{4T u \pi x}{417} = LITERS (Vm)$
	$Vs = Vm \times PA \times 298 = \frac{1.75}{1.75} \text{ LITERS (Vs)}^*$

*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

273 + tA



F/SOIL GAS



	FB
CLI	ENT: EPA ARCS DATE: 11/13/90 EPA SAS NO.: 5798E/ E-20.
SIT	E:
PRO	OJECTNO.: 20026 Field Blank
	MPLING TEAM: MKUENI/D. DOWNS /T. PUCHAISKI
	SAMPLING CONDITIONS
TEN	MPERATURE: °F − 32 x 5/9 = °C (ta) HNu: ppm
	ROMETRIC PRESSURE (PA): 30.23 mm Hg at 1215 AMPM H2S: ppm
REI	LATIVE HUMIDITY:% CH4:% CH4:%
WIN	ND: mph from
WE	ATHER: SUNNY
	MPLE GRID COORDINATES:NE taken at TTO7 MPLING INTERVAL:Ot ambient air only
	IL CONDITIONS AT SURFACE: NA
501	L CONDITIONS AT SURFACE: 7° 11
	PUMP CALIBRATION pump not used
PH	MP MFG/MODED/SN:
	LIBRATOR MFG/MODEL/SN:
	TIAL CALIBRATION (QA) TO L/MIN-AT TIME:
	LIBRATION VERIFICATION: ROTAMETER READING TIME:
*IF :	NOTAMETER READING TIME: SES SUSPECT, RESAMPLE % DIFFERENCE *
	, SAMPLE COLLECTION
TET	NAX 9 ARCOAL TUBE NUMBER: TC 46480 CHARGOALTENAX TUBE NUMBER: T60
	OP TIME: COLLECTION CONDITIONS:
	ART TIME: opened end capo for 10 minutes
TIM	E ELAPSED (T) 10,00 MINUTES - recapped at 10 cation 1107
	TOTAL VOLUMETRIC FLOW CALCULATION
Vm	=TxQA=4117 x +000 = LITERS (Vm) not applicable
	= Vm x PA x 298 = LITERS (Vs)
	760 273 + tA
*RE	CORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

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	SCIENTISTS

F/SOIL GAS



	${\mathfrak P}$
4	CLIENT: EDA ARCS DATE: 11/13/90 EPA SAS NO.: 5798E E 22, E-23
	SITE: HOMO DONOHUE SPL NO .: HD/TTO 9
=	PROJECT NO .: 20026 TRIP BLANIC
-	SAMPLING TEAM: M KUENI/D. Downs TT. Puchalski
	SAMPLING TEAM
	CAMPLING CONDITIONS
	SAMPLING CONDITIONS
	TEMPERATURE: $\frac{48}{}$ °F - 32 x 5/9 = ${}$ °C (ta) HNu: ${}$ ppm
	BAROMETRIC PRESSURE (PA): 30.23 mm Hg at 12/5 AMPM H2S:ppm
h	RELATIVE HUMIDITY: 92 % LEL
	WIND: mph from
_	WEATHER: SUNNY
•	not a pairelle
	SAMPLE GRID COORDINATES.:NE not applicable
•	SAMPLING INTERVAL:ft
	SOIL CONDITIONS AT SURFACE:
b	
	PUMP CALIBRATION
*	PUMP MFG/MODEL/SN: not applicable
=	CALIBRATOR MFG/MODEL/SN:
	INITIAL CALIBRATION (QA) TOL/MIN AT TIME:
	CALIBRATION VERIFICATION: ROTAMETER READING TIME: DOTAMETER DEADING
	*IF > 10%, SAMPLE ROTAMETER READING TIME: TUBES SUSPECT, RESAMPLE % DIFFERENCE
±	No Bill Elleroc
	CAMPLE COLUENTION
-	SAMPLE COLLECTION TENUAX 1
t.ll	CHARCOAL TUBE NUMBER: 1 X 7 2 9 1 CHARCOAL TENAX TUBE NUMBER: 1 19
	STOP TIME: COLLECTION CONDITIONS: UNDOS NED
	START TIME: ACCUMPANIED CAN 1 TUBE WITEN TIME ELAPSED IT NOT APPLICATE MINISTES STAPED FROM LAB
	TIME ELAPSED (T) NOT ABOUCANTEMINUTES STHOOLD FROM CAS
±	
	TOTAL VOLUMETRIC FLOW CALCULATION
ď	Vm = T x QA = = LITERS (Vm)
	Vs = Vm x PA x 298 = LITERS (Vs)* not appliable
lk.	760 273+1A
Į.	*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.





•	CLIENT: GPA ARCS DATE: 11/13/90 EPA SAS NO.: 5798E E-24, E-25 SITE: HMW DONOHUE SPL NO.: HDTT-10 PROJECT NO.: 20026 SAMPLING TEAM: M Vuehl/D. Downs/T Puchalski
	SAMPLING CONDITIONS TEMPERATURE: \$\frac{1}{2}\text{0} \cappa \cap
•	SAMPLE GRID COORDINATES:: N E L-18 SAMPLING INTERVAL: 2.00 ft SOIL CONDITIONS AT SURFACE: Sandy, VISIBLE CASDY
٠	SOIL CONDITIONS AT SURFACE: Sonary, VISIBUE 43-7
	PUMP MFG/MODEL/SN: Gillan Gilgir 12196 CALIBRATOR MFG/MODEL/SN: ELCAL Sensidyne 1251222 INITIAL CALIBRATION (QA) TO X=Y.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4.0 TIME: 1440 *IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 1505 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
ľ	
E-24	SAMPLE COLLECTION TENAX E CHARCOAL TUBE NUMBER: 1C 1 555 CHARCOAL/TENAX TUBE NUMBER: 14/6/ STOP TIME: STOPWARM START TIME: STOPWARM TIME ELAPSED (T) 10.00.00 MINUTES
•	
•	TOTAL VOLUMETRIC FLOW CALCULATION $Vm = T \times QA = 4.17 \times 4.17 = 417 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.75 \times LITERS (Vs)^{\circ}$ $760 \times 273 + 1A$





:	CLIENT: EPA ARCS DATE: 11/13/90 EPA SAS NO.: 3798E E-26, E-2 SITE: HMW DONOHUE SPL NO.: HDTI-11 PROJECT NO.: 20024 SAMPLING TEAM: M KWENL/D DOWNS/ TPUCKALSKI
	SAMPLING CONDITIONS
! !	TEMPERATURE: 48 °F - 32 x 5/9 = °C (ta) HNu: 0 ppm BAROMETRIC PRESSURE (Pa): 30.2 mm Hg at 121 AM(PM) RELATIVE HUMIDITY: 92 % WEATHER: 500 , 200 45
;	SAMPLE GRID COORDINATES.: N E L-21 SAMPLING INTERVAL: Z'7" IT refusal SOIL CONDITIONS AT SURFACE: Sundy, dry
(PUMP MFG/MODEL/SN: Gilan / 2/96 CALIBRATOR MFG/MODEL/SN: ECAL/Sensidyne / 25/222 INITIAL CALIBRATION (QA) TO X-4/17 (n>7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4. 2000 TIME: 15/0 PIF > 10%, SAMPLE ROTAMETER READING 4. 2000 TIME: 1533 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
E é	E-26. SAMPLE COLLECTION
oper 1	CHARCOAL TUBE NUMBER: TC 4754 STOP TIME: START TIME: S
	TOTAL VOLUMETRIC FLOW CALCULATION

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.75 \times (Vs)^*$ $Vs = Vm \times PA \times 298 \times (Vs)^*$





-	CLIENT: <u>EPA ARCS</u> DATE: <u>II/13/90</u> EPA SAS NO.: <u>5748E - 28, E-29</u> SITE: <u>Homas</u> DONOHUE SPL NO.: <u>HDTT - 12</u> PROJECT NO.: <u>30026</u>
	SAMPLING TEAM: TO KUCHIAD. DOWNS/TPYCHOLOKI
	CAMPLING CONDITIONS
-	SAMPLING CONDITIONS TEMPERATURE: °F - 32 x 5/9 = °C (tA)
•	SAMPLE GRID COORDINATES: N E I-22 SAMPLING INTERVAL: 3.00 # SOIL CONDITIONS AT SURFACE: Wind - Sind near asphalt piles
	PUMP CALIBRATION WANDEL/SN: Gilan / Gilar / 251222 2196 CALIBRATOR MFG/MODEL/SN: E2 Cal (Sensidyne / 251222 1000) INITIAL CALIBRATION (Qa) TO X= Y.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4.0 TIME: 1545 *IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 1620 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0 •
	SAMPLE COLLECTION
E-28 hole open 1540	TENAX & E-29 mm CHARCOAL TUBE NUMBER: 13262 STOP TIME: Used COLLECTION CONDITIONS: START TIME: STOPWOTCH INTENT VICLIUM CONDITIONS TIME ELAPSED (T) 10.00 MINUTES VALIBLE NOTATIONS
	TOTAL VOLUMETRIC FLOW CALCULATION Vm. Tv. OA. 10, 99 v. 4,17 VI. 7 LITERS (Vm.)

*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

 $Vs = Vm \times PA \times 298$ 760 × 273 + tA





•	CLIENT: EPA APCS DATE: 11/13/90 EPA SAS NO.: 5798É E.30, E.31 SITE: Hymus DONOHUE SPL NO.: HDTT-13 PROJECT NO.: Z0026 SAMPLING TEAM: M Yuche / D Downs / T Puchalsku
	SAMPLING CONDITIONS TEMPERATURE: °F - 32 x 5/9 = °C (ta)
•	SAMPLE GRID COORDINATES:: N E I-21 SAMPLING INTERVAL: 3.00
	PUMP CALIBRATION PUMP MFG/MODEL/SN: Gilan Gilair / 2196
	CALIBRATOR MFG/MODEL/SN: ECAL Servidane /25/222 INITIAL CALIBRATION (QA) TO X=4.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4.0 TIME: 1645 *IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 1715 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0
E-30 hole gen 1645	CALIBRATOR MFG/MODEL/SN: Excal Sensidyne /25/222 INITIAL CALIBRATION (QA) TO X=4.17 (n=7) L/MIN AT TIME: 0530 CALIBRATION VERIFICATION: ROTAMETER READING 4.0 TIME: 1645 *IF > 10%, SAMPLE ROTAMETER READING 4.0 TIME: 1715

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.75 \text{ LITERS (Vs)}^*$



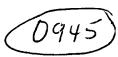
₹ .043

F/SOIL GAS



	CLIENT: <u>EPA ARCS</u> DATE: 11/14/90 EPA SAS NO.: 5798E E-32.E-33
	SITE: Homeo DONOHUE SPL NO.: HDTT-14
•	PROJECT NO.: 20026
	SAMPLING TEAM: M. Kuen/ D. Downs /T. Puchalski
	SAMPLING CONDITIONS
1	TEMPERATURE: 35 °F - 32 x 5/9 = 1.67 °C (ta) HNu: 0 ppm
	BAROMETRIC PRESSURE (PA): 30.20 mm Hg at 0800 AMPM H2S: 0 ppm
. .	RELATIVE HUMIDITY: 81 % CH4: 0 % LEL
	WIND: $5-10$ mph from $5E$
,	WEATHER: Sunny, mild
	SAMPLE GRID COORDINATES.: N E D-24
,	SAMPLE GRID COORDINATES.: N E D-24 SAMPLING INTERVAL: 3.0 ft
	SOIL CONDITIONS AT SURFACE: Sandy, V, SIble Casoy
)	
	PUMP CALIBRATION Pump (al readings 4.25
,	PUMP MFG/MODEL/SN: Gillan /Gilair /2196 4.23 4.08
	CALIBRATOR MFG/MODEL/SN: EZGI / Sensidyne /25/222
_	INITIAL CALIBRATION (QA) TO X= 4.17
	CALIBRATION VERIFICATION: ROTAMETER READING 400 TIME: 0840 *IF > 10%, SAMPLE ROTAMETER READING 4.00 TIME: 48 0420
•	*IF > 10%, SAMPLE ROTAMETER READING 4.50 TIME: 43.5920 TUBES SUSPECT, RESAMPLE % DIFFERENCE
	SAMPLE COLLECTION
· E-32	TENAX + CHARCOAL TUBE NUMBER: TEYLUS CHARCOAL TUBE NUMBER: TY716
	STOP TIME: COLLECTION CONDITIONS:
hd?	START TIME: Watch aules though waste, 3 asserte
0849	TIME ELAPSED (T) 10.00 MINUTES "Tomes" Let alling probe insersor
•	
	TOTAL VOLUMETRIC FLOW CALCULATION
	$Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$
	Vs = Vm x PA x 298 = 1.79 LITERS (Vs)*
	760 273 + 4 1.67
	*RECORD VS IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.





CLIENT:	EPA A	12C5 Co	DATE: _	11/14/40		o.: <u>5748</u> spl no.: <u>H</u> J	E E-34, E-3; DT-15
PROJECT SAMPLING	Г NO.: <i>Э.С</i> G TEAM:	M Kueh	1/DD	ouns/T.	Puchals		
		7. /		LING CONDITION	IS	0	
		_		1.67 °C (tA)			ppm
			<u>∠o</u> mm Hg	at <u>0800</u> (AM)	PM	H ₂ S:	• •
	E HUMIDITY:		% SE			CH4:	_ % LEL
	5-10						
WEATHER	R: <u>Sunn</u>	19, MILA					
SAMPLIN	G INTERVAL:	3.6		E	F-25		
SOIL CON	IDITIONS AT	SURFACE:					
			DUIA	IP CALIBRATION			
CALIBRATINITIAL CALIBRATINITIAL CALIBRATINITIAL CALIBRATINITIAN (CALIBRATINITIAN CALIBRATINI CALIB	TOR MFG/MC ALIBRATION TION VERIFIC	(QA) TO XEC CATION:	/ 6/01/2 2001 / 1 4.17 ROTAME	SENSIDYNE SENSIDYNE SET LIMIN TER READING - TER READING -	I AT TIME:(4.00 TI	0600 ME: <u>0935</u>	
TENAX CHARCOA STOP TIM START TII TIME ELA	IE: U	ABER: TC: sed stopulated 0.00		PLE COLLECTION CHARCOAL/TE COLLECTION (Suit	NAX TUBE NUCONDITIONS:	ed ut 30	12 0-60 seconds

TOTAL VOLUMETRIC FLOW CALCULATION

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$ $Vs = Vm \times PA \times 298 = 1.79 \text{ LITERS (Vs)}^{+}$





	CLIENT: <u>EPA ARCS</u> DATE: <u>II/14/80</u> EPA SAS NO.: <u>5798 E E-36, E-37</u> SITE: <u>Homo</u> DONOHUE SPL NO.: <u>HDTT 16</u>
	PROJECT NO .: 20026 SAMPLING TEAM: M Kuehl/D. Downs / T. Puchalski
•	SAMPLING CONDITIONS
•	TEMPERATURE: 35 °F - 32 x 5/9 = 1.67 °C (ta) HNu: 0 ppm BAROMETRIC PRESSURE (Pa): 30.20 mm Hg at 0800 AMPM H2S: 0 ppm RELATIVE HUMIDITY: 81 % CH4: 0 % LEL WIND: 370 mph from 56
	SAMPLE GRID COORDINATES.:NE K-14 SAMPLING INTERVAL:3.0ft SOIL CONDITIONS AT SURFACE:52ndy, dead sumac
•	PUMP CALIBRATION PUMP MFG/MODEL/SN: Gilian / Gilair / 2196 CALIBRATOR MFG/MODEL/SN: Elal / Sensidyne /25/22 INITIAL CALIBRATION (QA) TO X=4.17 h=7 L/MIN AT TIME: 0600 CALIBRATION VERIFICATION: ROTAMETER READING 4.00 TIME: 1005 *IF > 10%, SAMPLE ROTAMETER READING 4.00 TIME: 1035 TUBES SUSPECT, RESAMPLE % DIFFERENCE 0 •
E-36 hole oper 1010	SAMPLE COLLECTION TENAX E CHARCOAL TUBE NUMBER: 1 (4)26 STOP TIME: START TIME: STOP TIME: SUCTION CONDITIONS: START TIME: SUCTION CONDITIONS: SUCTION CUBELLE, I htern/thent VOIL (156) Vo tamela readings
•	TOTAL VOLUMETRIO ELOW CALCULATION

TOTAL VOLUMETRIC FLOW CALCULATION

 $Vm = T \times QA = 10.00 \times 4.17 = 41.7$ LITERS (Vm) $Vs = Vm \times PA \times 298 = 1.79$ LITERS (Vs)*





ľ	CLIENT: $EPA ARCS$ DATE: $11/19/90$ EPA SAS NO.: $5798 \in 638, \epsilon 39$
	SITE: Home DONOHUE SPL NO.: HD FD TT 16
1	PROJECT NO.:
	SAMPLING TEAM: M KUEHI D. Downs T. Puchalski
)	
	SAMPLING CONDITIONS
1	TEMPERATURE: 35 °F - 32 x 5/9 = 1.67 °C (ta) HNu: 0 ppm
	BAROMETRIC PRESSURE (PA): 30. 20 mm Hg at 0800 AMPM H2S: 0 ppm
	RELATIVE HUMIDITY: 91 % CH4: 0 % LEL
	WIND: 5-10 mph from SE
	WEATHER: SJANY MILA
	SAMPLE GRID COORDINATES.: N E KIY
	SAMPLING INTERVAL:ft
	SOIL CONDITIONS AT SURFACE: Sandy, deal sumac
	PUMP CALIBRATION
	PUMP MFG/MODEL/SN: Gilian / Gildir / 2196
	CALIBRATOR MFG/MODEL/SN: <u>Ecal / sensidyne /25/222</u>
	INITIAL CALIBRATION (QA) TO X=Y.17 N=7 L/MIN AT TIME:
	CALIBRATION VERIFICATION: ROTAMETER READING $\frac{4.00}{4.00}$ TIME: $\frac{635}{4.00}$
	*IF > 10%, SAMPLE ROTAMETER READING 4.00 TIME: 1100
	TUBES SUSPECT, RESAMPLE % DIFFERENCE
	TENAX 8 SAMPLE COLLECTION TENAX 8 SAMPLE COLLECTION TENAX 8 SAMPLE COLLECTION
E-38	CHARCOAL TUBE NUMBER: TCY742 CHARCOAL TENAX TUBE NUMBER: T4698
`	STOP TIME: COLLECTION CONDITIONS:
	TANT TIME.
	TIME ELAPSED (T) 10.30 MINUTES
	10.00 TOTAL VOLUMETRIC FLOW CALCULATION
	$Vm = T \times QA = 4.00 \times 4.17 = 41.7 \text{ LITERS (Vm)}$
	Vs = Vm x PA x 298 = 1.74 LITERS (Vs)*
	760 273 + tA



F/SOIL GAS



5	CLIENT: <u>EPA ARCS</u> DATE: 11/14/90 EPA SAS NO.: 5798 E E-42, E-4
	SITE: Home DONOHUE SPL NO.: HD TMS DO /
•	PROJECT NO.: 20026
	SAMPLING TEAM: MKUCH
	SAMPLING CONDITIONS
	TEMPERATURE:°F - 32 x 5/9 =°C (ta)
	BAROMETRIC PRESSURE (PA): mm Hg at AM/PM H2S:ppm
	WIND: mph from not applicable CH4: % LEL
	WEATHER:
	WEATHER.
	SAMPLE GRID COORDINATES.: N E
	SAMPLING INTERVAL:tt
	SOIL CONDITIONS AT SURFACE:
_	SCIZCONDITIONS AT SCRI ACE.
•	PUMP CALIBRATION
	1 = 00)/(0/2/2/2
ð	PUMP MFG/MODEL/SN:
	INITIAL CALIBRATION (QA) TO L/MIN AT TIME:
	CALIBRATION VERIFICATION: ROTAMETER READING TIME:
	*IF > 10%, SAMPLE ROTAMETER READING TIME:
	TUBES SUSPECT, RESAMPLE % DIFFERENCE
ĺ	SAMPLE COLLECTION
F-47.	CHARCOAL TUBE NUMBER: TC 4735 E-43 CHARCOAL TUBE NUMBER: TY673
i	STOP TIME: COLLECTION CONDITIONS:
J	START TIME: matrix sike duplicate
	TIME-ELAPSED (T) MINUTES UVEXPODED Tibes
•	
	TOTAL VOLUMETRIC FLOW CALCULATION
,	Vm = T x QA = x = LITERS (Vm) and and i calle
	Vm = T x QA = = LITERS (Vm) not applicable Vs = Vm x PA x 298 = LITERS (Vs)*
1	760 273 ± IA
-	*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.



F/SOIL GAS

	CLIENT: EPA ARCS DATE: 11)14/90 EPA SAS NO.: 5798E E-44, E-45
	SITE: Hynco DONOHUE SPL NO.: HD TT MSO2
	PROJECT NO.: 20026
	SAMPLING TEAM:
	SAMPLING CONDITIONS
1	TEMPERATURE:
	BAROMETRIC PRESSURE (Pa): mm Hg at AM/PM H2S: ppm
,	RELATIVE HUMIDITY:% LEL
	WIND: mph from Not applicable CH4:% LEL
	WEATHER:
•	
	SAMPLE GRID COORDINATES.: N E
i	SAMPLING INTERVAL:ft
	SOIL CONDITIONS AT SURFACE:
)	
	PUMP CALIBRATION
}	PUMP MFG/MODEL/SN:
•	CALIBRATOR MFG/MODEL/SN:
	INITIAL CALIBRATION (QA) TO L/MIN AT TIME:
	CALIBRATION VERIFICATION: ROTAMETER READING TIME:
	*IF > 10%, SAMPLE ROTAMETER READING TIME: TUBES SUSPECT, RESAMPLE % DIFFERENCE
1	76 DIFFERENCE
	SAMPLE COLLECTION E-V)
E-44	CHARCOAL TUBE NUMBER: TC3148 MEHARCOAL TENAX TUBE NUMBER: T 4715
	STOP TIME: COLLECTION CONDITIONS: COLLECTION CONDITION CONDITION CONDITION CONDITION CONDITION CONDITION COLLECTION
	START TIME: pot applicable matrix solve time ELAPSED (T) MINUTES Wexposed tubes
	THE LEAT OLD (1)
	TOTAL VOLUMETRIC FLOW CALCULATION
	Vm = T x QA = x LITERS (Vm)
	Vs = Vm x PA x 298 = LITERS (Vs)* Not applicable
	760 273 + IA
	*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

Donohue	ENGINEERS
	ARCHITECTS
	SCIENTISTS

F/SOIL GAS

1	CLIENT: <u>EPA ARCS</u> DATE: <u>IIIIY/90</u> EPA SAS NO.: <u>5798 E E - 76, E - 49</u> SITE: <u>HD TIMSDO2</u> PROJECT NO.: <u>20026</u> SAMPLING TEAM: <u>M. Kuehl</u>
ı	
	SAMPLING CONDITIONS
	TEMPERATURE: °F - 32 x 5/9 = °C (tA) HNu: ppm BAROMETRIC PRESSURE (PA): mm Hg at AM/PM H2S: ppm RELATIVE HUMIDITY: % CH4: % LEL WIND: mph from not applicable WEATHER:
ı	SAMPLE GRID COORDINATES.: N E SAMPLING INTERVAL: ft
	SOIL CONDITIONS AT SURFACE:
,	PUMP CALIBRATION
	PUMP MFG/MODEL/SN:
•	
E-46	SAMPLE COLLECTION WHE E-47 CHARCOAL TUBE NUMBER: TC 4141 CHARCOALTENAX TUBE NUMBER: T4694 STOP TIME: COLLECTION CONDITIONS: START TIME: Application TIME ELAPSED (T) MINUTES Wexposed tubes
•	
	TOTAL VOLUMETRIC FLOW CALCULATION
•	Vm = T x QA = x = LITERS (Vm) Vs = Vm x PA x x 298 = LITERS (Vs)* not applicable
-	*RECORD Vs IN LITERS ON SAS CHAIN OF CUSTODY REMARKS COLUMN.

ATTACHMENT C

LABORATORY RESULTS FIELD TRIAL SAMPLES

Transmission from:

ITAS - Cincinnati 11499 Chester Road Cincinnati, Ohio 45246

FAX # (513) 782-4644

Voice # (513) 782-4600

From:	PATRICK FARRELL
epartment:	GC/MS
To: _	CHARLENE KHAZAE / MARCA KUHEL
Company: _	DONAHUE & ASSOCIATES
epartment: _	
FAX #: _	1-414-458-0550
Voice #: _	
S	pecial Instructions/Comments:
FORM	IA & LE FOR SAS PROJECT # 5798-E
FOR	FURTHER INFO CONTACT PATRICK FARRELL
**************************************	a 513-782-4805
	••
	•

VOLATEE ORGANICS ANALYSIS DATA SHEET

HDTT01-01

LAB NAME: PELASSOCIATES CONTRACT: SAS 5798-E 5798E-1 / 5798E-2

SAMPLE MATRIX: TENAX LAB SAMPLE D: X0-11-064-01A

SAMPLE YT/VOL: NA LAB FILE D: 5798-E1

LEVEL:(low/med) LOW DATE RECIEVED: 11/8/90

% MOISTURE: not dec. NA DATE ANALYZED: 11/8/90

DEUTION FACTOR: 1

CONCENTRATION UNITS: NG/L

		CONCENTRATION UNITS: NG/L
CAS NO.	COMPOUND	N6_86 - 0
		DET. LIMIT
74-87-3	CHLOROMETHANE	3.18 U
74-83-9	BROMOMETHANE	3 +0 U
75-01-4	VINYL CHLORIDE	3-10 U
75-00-3	CHLOROETHANE	3 10 0
75-09-2	METHYLENE CHLORIDE	83 8
67-64-1	ACETONE	18 5 10
75-15-0	CARBON DISULFIDE	ال 2 م 2
75-35-4	1,1-DICHLOROETHENE	2,5 U
75-34-3	1,1-DICHLOROETHANE	2,5 U
540-59- 0	1,2-DICHLOROETHENE (TOTAL)	250
67-66-3	CHLOROFORM	2 B U
107-06-2	1,2-DICHLOROETHANE	250
78-93-3	2-BUTANONE	3 10 U 2 5 U
71-55-6	1,1,1-TRICHLOROETHANE	
56-23-5	CARBON TETRACHLORIDE	2 B U
109-05-4	VINYL ACETATE	3-10 U
75-27-4	BROMODICHLOROMETHANE	2.5 U
78-87-5	1,2-DICHLOROPROPANE	2 /5 U
10061-01-5	ois-1,3-DICHLOROPROPENE	25 U
79-01-6	TRICHLOROETHENE	25 U
124-48-1	DIBROMOCHLOROMETHANE	2.5 U
79-00-5	1,1,2-TRICHLOROETHANE	25 U
71-43-2	BENZENE	2 5 3
10061-02-6	trans-1,3-DICHLOROPROPENE	2 5 U
75-25-2	BROMOFORM	2 × U
108-10-1	4-METHYL-2-PENTANONE	3 10 0
591-78-6	2-HEXANORE	3 70 0
127-18-4	TETRACHLOROETHENE	2 8 U 2 8 U
79-34-5	1,1,2,2-TETRACHLORGETHANE	2 g U
100-08-3	TOLUENE	72 24 \$
108-90-7	CHLOROBENZENE	25 U
100-41-4	ETHYL BENZENE	2.5 U
100-42-5	STYRENE	28 U
1330-20-7	XYLENE (TOT AL)	2,5 U
		الماك التعريب والمراك التراقف والمفروق الكنيس التيوي والمراجع المستجود والمستجود والمستجود

FORM 1 A VOA

VOLATILE ORGANICS ANALYSIS DATA SHEET TENATIMELY IDENTIFIED COMPOLINGS

HDTT01-01

LAB NAME: PEI ASSOCIA	ATES	CONTRACT:	SAS 5798-E	5798-E1 / S	7 98-E 2
SAMPLE MATRIX:	TENAX	LAB SAMPLE	D:	X0-11-064-	01 A
SAMPLE WT/VOL:	NA	LABFLE D:		5798-E1	
LEVEL:(low/med)	LOY	DATE RECEY	D:	11/8/90)
% MOISTURE: not dec.	NA	DATE MALY	Æ D:	11/8/90	<u> </u>
NUMBER OF TIC'S FOUND:	2	DILUTION FAC	TOR:	1	-
CAS NUMBER	CONFOUND NAME -		CONCENTRAT RET. TIME		NG/
76-13-1	112-TRICHLOR0-122-TRIF		9:22	20.50	7 7
	UNKNOWN HYDROCARBON	·····	1126	3 18	5
	<u> </u>	•	·		1
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_					
			 		
			<u> </u>		

	<u> </u>				

VOLATILE ORGANICS ANALYSIS DATA SHEET

1t0TT02-01

LAB NAME: PEI ASSOCIA	ATES	CONTRACT: SAS 5798-	57988-3 / 57988-4
SAMPLE MATRIX:	TENAX	LAS SAMPLE D:	X0-11-064-02A
SAMPLE YT/VOL:	<u>NA</u>	LAS FILE ID:	5798-E3
LEYEL :(low/med)	LOV	DATE RECEVED:	11/8/90
% MOISTURE: not dec.	NA	DATE ANALYZED:	11/8/90
		DILUTION FACTOR:	

CAS NO.	COMPOUND	CONCENTRATION UNITS: NG/1
		DET. LIMIT
74-87-3	CHLOROMETHANE	5 xd U
74-83-9	BROMOMETHANE	5 18 U
75-01-4	VINYL CHLORIDE	5 Jet U
75-00-3	CHLOROETHANE	5 10 0
7 5-09- 2	METHYLENE CHLORIDE	8 B 74 B
67-64-1	ACETONE	18.8 70
75-15-0	CARBON DISULFIDE	73 8
75-35-4	1,1-DICHLOROETHENE	2 × U
75-34-3	1,1-DICHLOROETHANE	2 x5 U
540-59-0	1,2-DICHLOROETHENE (TOTAL)	2 8 U
67-66-3	CHLOROFORM	2 × U
107-06-2	1_2-DICHLOROETHANE	1 2.81 0
78-93-3	2-BUT ANCHE	5 10 U
71-55-6	1,1,1-TRICHLOROETHANE	82 8
56-23-5	CARBON TETRACHLORIDE	2 N U
108-05-4	VINYL ACETATE	5 X0 U
75-27-4	BROMODICHLOROMETHANE	2 & U
78-87-5	1,2-DICHLOROPROPANE	2 x U
10061-01-5	ois-1,3-DICHLOROPROPENE	2 x U
79-01-6	TRICHLOROETHENE	2 /S U
124-48-1	DIBROMOCHLOROMETHANE	2 & U
79-00-5	1,1,2-TRICHLOROETHANE	2月 U
71-43-2	BEKEENE	12 X J
10061-02-6	trans-1,3-DICHLOROPROPENE	2 × U
75-25-2	BROMOFORM	2 x u
108-10-1	4-METHYL-2-PENT ANONE	5 M U
591-78-6	2-HEXANONE	5 X0 U
127-18-4	TETRACHLOROETHENE	2 × U
79-34-5	1,1,2,2-TETRACHLOROETHANE	2×8 U
108-88-3	TOLUENE	5731 8
106-90-7	CHLOROBENZENE	2 8 U
100-41-4	ETHYL BENZENE	2 × U
100-42-5	STYRENE	2 8 U
1330-20-7	XYLENE (TOTAL)	28 0

VOLATRE ORGANICS ANALYSIS DATA SHEET TENATIVELY IDENTIFIED COMPOUNDS

HDTT02-01

LAB NAME: PEI ASSOCIA	ITES	CONTRACT	SAS 5798-E	5798-F3 / 57	79R-F4
					
Sample Matrix:	TENAX	LAB SAMPLE	D:	X0-11-064-0	<u>24</u>
SAMPLE YT/VOL:	<u>NA</u>	lab file D:		5798-E3	
LEVEL:(low/med)	LOY	DATE RECEVE	D:	11/8/90	
95 MOISTURE: not dec.	NA	DATE ANALYZ	5 D:	11/8/90	
NUMBER OF TIC'S FOUND:	3	DILUTION FAC	•	1	
CAS NUMBER	COMPOUND NAME		CONCENTRATI	ON UNITS: N	6/1
76-13-1	112-TRICHLORO-12	22-TRIFLUOROETHANE	9:18	100300	7
	UNKNOWN HYDROC		11 22	10 28	
	UNKNOWN HYDROC	ARBON	16:22	4 8	J
	 				
					
<u> </u>					
	<u> </u>				
	 				
					

VOLATEE ORGANICS ANALYSIS DATA SHEET

HDTT03-01

LAB NAME: PEI ASSOCIA	ATES	CONTRACT: SAS 5798-E	5798E-5 / 5798E-6
SAMPLE MATRIX:	TENAX	LAB SAMPLE D:	X0-11-064-03A
SAMPLE YT/VOL:	NA	LAB FRE D:	5798-E5
LEVEL (low/med)	<u>raa</u>	DATE RECEVED:	11/8/90
% MOISTURE: not dec.	NA	DATE ANALYZED:	11/8/90

DILUTION FACTOR: 1

		CONCENTRATION UNITS: NG/L
CAS NO.	COMPOUND	NG_OC 0
		DET. LIMIT
74-87-3	CHLOROMETHANE	<u> </u>
74-63-9	BROMOMETHANE	11 78 U
75-01-4	VINYL CHLORIDE	/ 1 30 U
75-00-3	CHLOROETHANE	11 10 U
75-09-2	METHYLENE CHLORIDE	15 15 B
67-64-1	ACETONE	JE 18 30
75-15-0	CARBON DISULFIDE	6 × U
75-35-4	1,1-DICHLOROETHENE	680
75-34-3	1,1-DICHLOROETHANE	6 8 U
540-59-0	1,2-DICHLOROETHENE (TOTAL)	6 & U
67-66-3	CHLOROFORM	6 8 U
107-06-2	1_2-DICHLORGETHANE	6 15 1
7 8-9 3-3	2-BUT ANONE	ט (סגן ו
71-55-6	1,1,1-TRICHLOROETHANE	6 & U
56-23-5	CARBON TETRACHLORIDE	6 8 U
108-05-4	VINYL ACETATE	ע סג וו
75-27-4	BROMODICHLOROMETHANE	6 A U
78-87-5	1,2-DICHLOROPROPANE	U & D
10061-01-5	ois-1,3-DICHLOROPROPENE	6 28 U
79-01-6	TRICHLOROETHENE	6 A U
124-48-1	DEROMOCHLOROMETHANE	6 15 U
79-00-5	1,1,2-TRICHLOROETHANE	6 5 U
71-43-2	BENETNE	2· /5 J
10061-02-6	trans-1,3-DICHLOROPROPERE	6 S U
75-25-2	BROMOFORM	6 % U
108-10-1	4-METHYL-2-PENTANONE	II je u
591-78-6	2-IEXANONE	11 10 11
127-18-4	** TETRACHLOROETHENE	6 8 4
79-34-5	1,1,2,2-TETRACHLOROETHANE	6 8 U
108-88-3	TOLUENE	18-21 18
108-90-7	CHLOROBENZENE	6 % U
100-41-4	ETHYL BENZENE	6 x U
100-42-5	STYRENE	6 X U
1330-20-7	XYLEVE (TOTAL)	6 x U

VOLATILE ORGANICS ANALYSIS DATA SHEET TENATIVELY DENTIFIED COMPOUNDS

HOTTO3-01

LAB NAME: PELASSOCIA	TES	CONTRACT:	SAS 5798-E	5798-£5 / 5	798-E6
SAMPLE MATRIX:	TENAX	Lab sat p le	D:	X0-11-064-0	3A
SAMPLE YT/VOL:	<u>HA</u>	LABFLE D:		5798-E5	·
LEVEL (low/med)	FOA	DATE RECEVE	D:	11/8/90	
% MOISTURE: not dec.	<u>NA</u>	DATE ANALYZ	ED:	11/8/90	
NUMBER OF TIC'S FOUND:	1	DILUTION FAC		1	
CAS HUMBER	COMPOUND NAME ~		CONCENTRATI	ION UNITS: A	14/L
76-13-1	112-TRICHLORO-122-	TRIFLUOROETHANE	9:20	200	ਹ

VOLATLE ORGANICS ANALYSIS DATA SHEET

LAB NAME: PEI ASSOCI	ATES	CONTRACT: SAS 579	8-E VBLKACO
SAMPLE MATRIX:	TENAX	LAB SAMPLE ID:	VBLKACO
SAMPLE YT/VOL:	<u>NA</u>	LABFLE D:	VBUKACO
LEVEL (low/med)	LOY	DATE RECEVED:	11/8/90
% MOISTURE: not dec.	NA	DATE ANALYZED:	11/8/90
		DESITION FACTOR -	1

		CONCENTRATION UNITS:			
CAS NO.	COMPOUND	NG_DC	Q		
		DET. LIMIT			
74-87-3	CHLOROMETHANE """	10	ប		
74-83-9	BROMOMETHANE	10	U		
75-01-4	YIMYL CHLORIDE	10	U		
75-00-3	CHLOROETHANE	10	U		
75-09-2	METHYLENE CHLORIDE	10 5			
67-64-1	ACETONE	10	U		
75-15-0	CARBON DISULFIDE	5	บ		
75-35-4	1,1-DICHLOROETHENE	5	U		
75-34-3	1,1-DICHLOROETHANE	5	U		
540-59-0	1,2-DICHLOROETHENE (TOTAL)	5	บ		
67-66-3	CHLOROFORM	5	V		
107-06-2	1,2-DICHLOROETHANE	5	U		
78-93-3	2-BUTANONE	13 10			
71-55-6	1,1,1-TRICHLOROETHANE	5	Ų		
56-23-5	CARBON TETRACHLORIDE	5	U		
108-05-4	VINYL ACETATE	10	ช		
75-27-4	BROMODICHLOROMETHANE	5	U		
78-87-5	1,2-DICHLOROPROPANE	5	ีบ		
10061-01-5	ois-1,3-DICHLOROPROPENE	5	ีย		
79-01-6	TRICHLOROETHENE	5	U		
124-48-1	DIBROMOCHLOROMETHANE	5	U		
79-00-5	1,1,2-TRICHLOROETHANE	5	บ		
71-43-2	BENCENE	5	บ		
10061-02-6	trans-1,3-DICHLOROPROPENE	5	U		
75-25-2	BROMOFORM	5	U		
108-10-1	4-METHYL-2-PENTANONE	17 10			
591-7 8-6	2-HEXANONE	हु 10			
127-18-4	TETRACHLOROETHENE	5	U		
79-34-5	1,1,2,2-TETRACHLOROETHANE	5	U		
108-88-3	TOLUENE	5	U		
108-90-7	CHLOROBENZENE	5	U		
100-41-4	ETHYL BEIGENE	5	U		
100-42-5	STYRENE	5	υ		
1330-20-7	XYLENE (TOTAL)	5	U		

FORM 1A YOA

VOLATRE ORGANICS ANALYSIS DATA SHEET TENATIVELY IDENTIFIED COMPOUNDS

LAB NAME: PELASSOCIA	TES	CONTRACT: SAS 5798-E	VBLKACO	
SAMPLE MATRIX:	TENAX	LAB SAMPLE D:	YBLKACO	
SAMPLE YT/VOL:	NA	LAB FLE D:	YBLKACO	
LEVEL (low/med)	FOA	DATE RECEVED:	11/8/90	
% MOISTURE: not dec.	NA ·	DATE ANALYZED:	11/8/90	
		DILUTION FACTOR:	1	
NUMBER OF TIC'S FOUND:	0			
CAS NUMBER	COMPOUND NAME	CONCENTRAT RET. TIME	ION UNITS: NG OC O	
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TECHNICAL MEMORANDUM NUMBER 13

DATE: December 10, 1990

TO: Vanessa Harris

Project Files, Himco Dump Site

CC: M. Kuehl - RI Lead

R. Gau - Project Manager M. Crosser - TSQAM

FROM: Rob Cannestra, Hydrogeologist

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024 Himco Dump RI/FS Phase I

INSTALLATION OF WATER TABLE WELLS AND LANDFILL CAP SAMPLING

<u>Introduction</u>

Six shallow observations wells were installed on or adjacent to the Himco Dump site between the dates of November 5, 1990, and November 14, 1990. Water table observation wells were installed to obtain water elevation information and to allow for groundwater sampling. Tasks associated with the installation of these wells included logging and classification of continuously sampled soils, field screening of soil samples, collection of soil samples for chemical and geotechnical analysis, and well installation. In addition, geotechnical samples were taken from five locations on the landfill cap. Landfill cap samples were collected for testing to determine the engineering properties of the cap. The following text summarizes the methods and procedures used to complete these tasks and point out deviations from procedures written in the Field Sampling Plan (FSP) or drilling specifications.

Drilling and Sampling

Soil borings BRG-1 through BRG-6 were advanced using hollow stem auger techniques. The subcontractor, John Mathes and Associates (Mathes), used a Central Mine Equipment (CME) 550 ATV rig equipped with 4.25-inch ID (8.0-inch OD) hollow stem augers to complete these borings. All borings were continuously sampled from ground surface to total depth using a 3-inch OD stainless steel split spoon sampler. Two stainless steel split spoon samplers were used. Split spoon samplers were decontaminated between sampling intervals according to the following steps: (1) tap water rinse, (2) alconox wash, (3) tap water rinse, (4) isopropanol rinse, (5) two deionized water rinses.

At each location, borings were drilled and sampled to a depth of 16.0 feet to allow the well screen to be installed intersecting the water table. All borings were extended a nominal one foot by blind drilling with the hollow stem augers. The extension of borings was completed to accommodate any formation collapse during monitoring well installation. After completing a well installation, the drill rig and drilling tools were steam cleaned before proceeding to the next installation.

Field Screening and Logging of Soil Samples

After recovering the split spoon and immediately upon opening the sampler barrel, soil samples were field screened by slowly running an HNu photoionization detector (PID) over the length of the sample. The highest PID reading observed for each sample interval was recorded on the boring log.

After field screening, samples were collected for volatile organic compound (VOC) and other chemical analyses. Samples were logged by recording the attempted sample interval, sample length recovered, blow counts, and providing a visual description of the soil. Sample descriptions included the sample color (reference Munsell color chart), relative density, major and minor soil components, general engineering properties and references to the depositional environment. Based on these observations, soils were classified according to the Unified Soil Classification System (USCS). Completed soil boring logs are attached in Appendix A.

Sample Collection

Samples were collected for chemical and geotechnical analysis. Chemical sampling included samples for VOC, base neutrals (BNA), polychlorinated biphenyls (PCBs), cyanide and metals analysis. Geotechnical sampling included samples for Total Organic Carbon (TOC), Atterberg limits and grain size analyses. Samples collected during the completion of borings for water table well installations are summarized in Table 1.

Chemical Sampling

VOC samples were collected immediately after field screening the split spoon. Two 120 ml jars were filled with soil taken over the entire length of the recovered sample for VOC analysis. After filling the VOC sample jars, the remaining soil was emptied into a stainless steel mixing bowl and mixed with a stainless steel spoon. After mixing, two 8 oz. composite samples were taken of the homogenous soil mixture for BNA, PCB, and metals analyses. The sample mixing bowl and spoon were decontaminated between samples by the same method as the split spoon samplers.

According to the Work Plan, chemical samples were to be taken from the first five split spoons (upper 10 feet) at each shallow well location. However, elevated PID readings, peculiar odors or visual signs of contaminations required the collection of samples at depths below 10 feet. In these cases, the additional deeper samples were substituted for shallower samples displaying no signs of contamination. Potentially contaminated samples were collected below 10-foot depths in borings BRG-03, BRG-05, and BRG-06.

TABLE 1

RECORD OF COLLECTED SOIL SAMPLES WATER TABLE WELL BORINGS Himco Dump Site December, 1990

	Danth Tataman		CHEMICAL SAMPLING			GEOTECHNICAL SAMPLING		
Poring	Depth Interval(Feet)	VOCa	BNA/PCB	Metals	Dunlianto	TOC	Atterberg <u>Limits</u>	Crain Simo
Boring	(reet)	<u>VOCs</u>	<u>Pesticides</u>	Cyanide	<u>Duplicate</u>	TOC	LIMILS	<u>Grain Size</u>
BRG-01	0-2	X	x	X		X		
	2-4	X	X	X				
61016?	4-6	X	X	X				
GIOIC .	6-8	X	X	X	X			
	10-12	X	X	X				
	14-16						X	X
BRG-02	0-2	х	Х	х				
	2-4	X	X	X		X		
	4-6	X	X	X				
	6 - 8	X	X	X				
	8-10	X	Х	X				
	14-16						X	X
BRG-03	0-2	х	X	X				
	2-4	X	X	X				
	4-6	X	X	X	X			
	6 - 8	X	X	X				
	8-10	•				Х		
	14-16	X	Х	X			X	Х
BRG-04	0-2	х	Х	Х				
	2-4	X	Х					
	4-6	Х	Х	X				
	6 - 8	X	X	X				
	8-10	X	X	X				
	14-16						Х	X

TABLE 1

RECORD OF COLLECTED SOIL SAMPLES WATER TABLE WELL BORINGS Himco Dump Site December, 1990 (continued)

	Depth Interval		CHEMICAL SAMPLING BNA/PCB Metals			GEOTECHNICAL SAMPLING Atterberg		
<u>Boring</u>	(Feet)	<u>VOCs</u>	<u>Pesticides</u>		<u>Duplicate</u>	TOC	Limits	<u>Grain Size</u>
BRG-05	2-4	x	x	X	x			
	8-10	Х	X	X				
	10-12	X	X	X				
	12-14	Х	X	X				
	14-16	X	Х	X		X	X	Х
BRG-06	0-2	Х	X	х				
	4-6	X	X	X				
	6-8					X	X	X
	8-10	X	Х	Х				
	12-14	X	X	X				
	14-16	X	X	X				

W/A/AG7

Geotechnical Samples

Geotechnical samples were collected randomly from borings completed for the installation of shallow observation wells. With the exception of boring BRG-06, samples for Atterberg limits and grain size analysis were taken in the interval to be screened during the well installation. Samples for Total Organic Carbon (TOC) analysis were not collected from every boring completed for the installation of shallow observation wells.

Geotechnical samples were collected after retrieval of chemical samples from the remaining composited soil. One 8 oz. jar was collected for Atterberg limit and grain size analysis. An additional 8 oz. jar sample was taken for TOC analysis when applicable.

All samples were labelled, packaged, and shipped according to the details of the field sampling plan. The site sample custodian completed the appropriate chain-of-custody documentation. Samples were shipped to the appropriate labs by Federal Express.

Well Installations

Shallow observation wells W-101A through W-106A were installed to intersect the water table. Observations made during the drilling and sampling of borings completed for the installation of the wells were used to determine the depth of the water table. Because of the shallow water table encountered, modifications were made to the general well specifications to ensure that the well screens intersected the water table. Table 2 summarizes well construction information and general well information for water table observation wells at the Himco Dump site. Well construction diagrams are included in Appendix B.

Wells were constructed using Schedule 5, Type 304, flush threaded stainless steel riser attached to 10-foot, continuous wire wrap, 0.010-inch slot, stainless steel screens. Stainless steel screens and riser were manufactured by Diedrich. Well screens and riser were steam cleaned immediately proceeding installation, handled only while wearing clean latex gloves, and wrapped in protective plastic during transport. All flush threaded joints were wrapped with teflon tape to provide a tight seal. A concentrated effort was made to assure that well construction materials were not contaminated during handling or installation.

In general, observation wells were installed to depths of approximately 16 feet rather than the anticipated 20 feet. To allow for the installation of a 10-foot screen in these shallower borings, the thickness of the filter pack overlying the screen, bentonite seal, and concrete cap were decreased. In the modified well installations, filter packs were extended from 0.3 (WT-105A) to 1.2 (WT-101A) feet above the top of the well screen. Bentonite pellet seals were cut to a nominal 1.0-foot thickness rather than the specified 2.0 feet. The accuracy of measured depths was assured by the shallowness of these installations.

TABLE 2

WATER TABLE OBSERVATION WELL INFORMATION
Himco Dump Site
December 1990

		Plane inates	Top of Pipe	Screen Length	Depth to Bottom of Well	Depth to Bottom of boring	Depth to Bottom of Bentonite Seal
Well Number	North	East	<u>Elevation</u>	(Feet)	(Feet)	(Feet)	(Feet)
WT-101A	1,531,617.69	407,617.00	764.35	10	16.3	17.5	4.2
WT-102A	1,534,861.43	405,928.37	769.08	10	16.0	16.8	4.5
WT-103A	1,532,537.90	405,532.73	760.59	10	16.0	17.0	4.0
WT-104A	1,531,496.08	406,013.86	765.57	10	16.3	17.6	4.3
WT-105A	1,531,174.04	407,105.64	762.94	10	16.0	16.8	4.9
WT-106A	1,530,932.11	407,806.75	761.47	10	16.2	17.0	5.0

A/R/HIMCO/AH1

In addition, to facilitate the timely completion of wells, hydration times at several locations were shortened to approximately one-half hour. The integrity of these seals was visually checked prior to the installation of a concrete cap. Finally, concrete cap thickness was reduced from a specified 5.0 feet to a nominal 3.0-foot thickness to accommodate the shallow installation. None of these modifications is expected to adversely affect the performance of these wells.

Despite efforts made to ensure that well screens intersected the water table, the extremely shallow water table at the location of WT-103A made this impossible. During installation, depth to water in WT-103A was approximately 4.0 feet, placing the water level above the interval to be screened. Temporal fluctuations may cause water levels to decrease, potentially lowering the water level into the screened interval at this location.

Landfill Cap Geotechnical Samples

Geotechnical samples, including jar samples for grain size and Atterberg limit testing, and shelby tube samples for consolidation undrained triaxial shear were recovered from five locations on the landfill cap. Landfill cap sample locations varied slightly from those originally specified because they were located at points on the geophysical survey grid rather than the proposed site survey grid. The site survey grid was not completed at the time landfill cap samples were taken. Rather than sample at random or approximate locations on the cap, samples referenced geophysical survey grid points. Landfill cap geotechnical sample locations are included in the site location map (Figure 1).

Landfill cap samples were recovered by digging through the topsoil cover (average thickness approximately 0.5 feet) to the calcium sulfate cap. Once the cap was encountered, excavations were extended by hand to a depth of approximately 1.5 feet. At this depth, two pint size jar samples were collected for grain size and Atterberg limit testing. After collecting jar samples, the CME 550 drill rig was used to push 24-inch shelby tubes. The dense nature of the calcium sulfate cap made pushing the tubes difficult. At several locations, shelby tubes appeared to penetrate through the cap material into waste. If shelby tubes potentially encountered waste, they were marked as containing potential waste on the tube exterior. Additional shelby tube samples were attempted at two locations for one-dimensional consolidation testing, however, no sample was recovered at one location (adjacent to GE-01). Geotechnical sample holes were backfilled with spoils and hand compacted.

Atmospheric Monitoring

Air quality monitoring within the breathing zone and at the borehole was completed after recovery of the samples. A PID was used to monitor for volatile organic compounds. A GasTech® meter was used to monitor the levels of hydrogen sulfide (H₂S), oxygen, and indicate the percent of the Lower Explosive Limit (LEL) for methane. A miniRAD radiation detector was used to monitor for radioactivity. The highest readings produced by each instrument were recorded in the sections provided on the boring log. During the drilling and sampling of BRG-06, one sampling team member became physically ill while jarring samples from the 12 to 14-foot depth interval. However, atmospheric monitoring of

the borehole and recovered sample did not show any elevated readings at this depth. Atmospheric monitoring results recorded during the completion of borings is included in the completed soil boring logs attached in Appendix A.

Atmospheric monitoring was completed periodically during well installations. Efforts were made to take readings at the beginning of the installation procedure and during the installation as sections of auger were removed from the boring. Atmospheric monitoring during well installations was generally terminated after the installation of the bentonite seal as the boring was then considered effectively plugged off. Results of atmospheric monitoring during well installations were recorded on daily atmospheric monitoring logs attached in Appendix B.

During the recovery of geotechnical samples from the landfill cap, atmospheric monitoring was complete as shallow excavations were completed and as shelby tubes were withdrawn. Atmospheric readings taken during geotechnical sampling of the landfill cap were recorded on daily atmospheric monitoring logs attached in Appendix C.

No elevated levels were recorded during atmospheric monitoring conducted during the completion of shallow wells and landfill cap geotechnical sampling.

SUMMARY

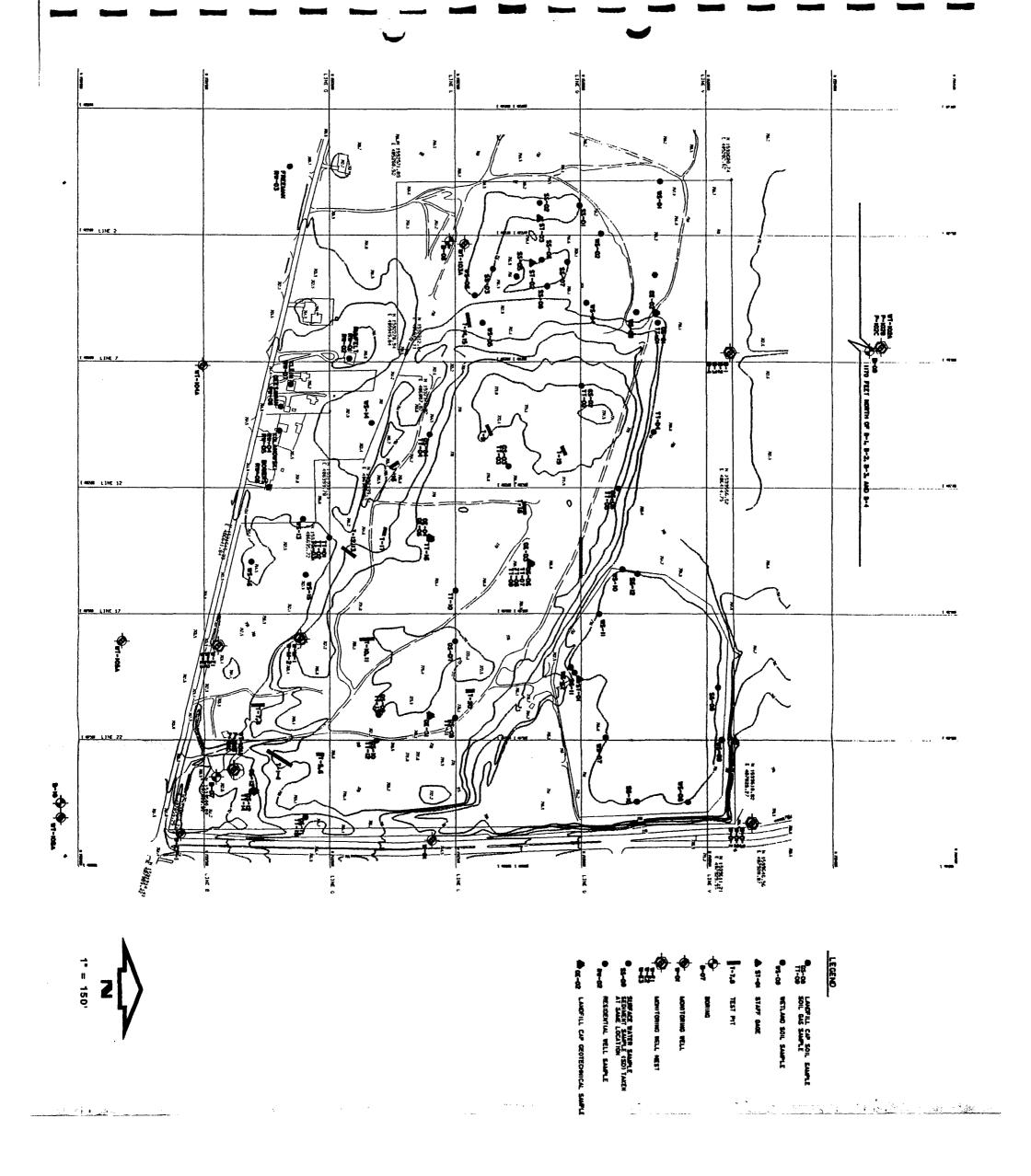
Six shallow soil borings were completed for the installation of water table observation wells. Soil samples were recovered for chemical analysis from the 0 to 10-foot depth interval or if contamination was indicated or observed, from intervals below 10 feet. Contamination was observed at depths below 10 feet in borings BRG-01, BRG-03, BRG-05, and BRG-06. Soil samples were submitted for VOC, BNA, PCB, pesticides, metals and cyanide analyses. Select soil samples were submitted for geotechnical analyses including TOC, grain size, and Atterberg limits.

Six water table observation wells were installed to intersect the water table. These wells were constructed to provide groundwater elevation information and to facilitate groundwater sampling. Concrete cap and bentonite seal thicknesses were modified to accommodate proper screening due to the shallow water table. Despite these efforts, the water level in WT-103A is above the well screen.

Geotechnical samples of the landfill cap below the surface cover were collected to determine the engineering properties of the cap. Jar and shelby tube samples of the landfill cap were collected and submitted for grain size, Atterberg limit, consolidation undrained triaxial shear, and non-dimensional consolidation testing. Shelby tube samples were potentially pushed into waste material and were appropriately labeled. At one shelby tube sample location, no sample was recovered.

A/R/HIMCO/AG8

FIGURE 1 SAMPLE LOCATION MAP



MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



APPENDIX A SOIL BORING LOGS

BORING LOG

. SOIL BORING NO.

Engineers & Architects

SITE: POMP PROJECT NO. 20023 023

BRG-Ø1

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BORING LOG

SOIL BORING NO.

Engineers	& Architects
CONTUINED ALIDED	(FSION/THATTING

SITE: HIMCO DUMP PROJECT NO. 20026.

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	OUTWAS	H <	50	MD, 10 YR 10/2. PALE	LE-M. DUAST	2. YT) C	2	W,	55-Y	७-८	14:26	0.2	20.4/	٥
	-	+		NON PLASTIC, SL FRAGMENTS, MOIST	1647 CORECION	TO DECANE	_		3,11	2,0 4000				
-		†	F					18						
·		1	>P	MD, 10YO 6/4, LT YELL SUBBNO, FROSTED, D	ONISH PROWN S WARTENTIC GRAIN	AND EM	14	W	55-5	<i>8</i> -10	14:59	0.2	20.5%	٥
L	<u>-v</u> -	+		SANO MOIST - WET	SLIGHT COMEDION	s, TR Co	\bot		3"	D.Z				
-	=	 		(A) 20.02 T7 CD.08 CH	ange to			N/		5000				
	DUTWAS!	5	ρ '	MD 10 YR 4/4 DK YEU	WISH BROWN		20	V	4.6	10-12	15:05	0.2	20.4	٥
				NON CONESINE TO	PITTER NOUP	ACTE		W	3*	2.0				
-				SATURATED.				N.		26007				
-		-		DENCE DYE 5/2 BEOT	ORGINE DE	Muld	20	W	55-7	12-14	15:35	0.2	3.4/	0
Ì		<u> </u>	Ρ	TNT - KUE BING 3"				W	3"	0.2				·
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BORING LOG

SOIL BORING NO.

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,	!	A LOG DRILL	1	12 i.D. 25 w/ 7. CA D. E	D. d. 165° CD) HCLLOW 5 / CME 550 NNESTRA LL15 R, LT 3255ZE	TEM_	DATE	TIME	READINGS DEPTH		SING	- (OOR(DATE DATE	ND SURF DINATES: NI E. START: COMPLE INSTAL	ORTH: AST: L\ TE:	ार्क़ <u>दि</u> ष		
#				uscs		DESCRI	PTION	AND			S	AMP	LING D	ATA		AIR MO	NITORING	
	96	E EWI	ROMENT	10363		LLING C			- 6-	8	N A	R		INTERVAL			2 LEL	1
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BORING LOG

SOIL BORING NO.

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_	ngineers		nitects SITE:_	DUMP	PRO.	JECT N	10.	22	026				\sum_{i}	
	CONFUTER ALDE	D DESIGNO	WTDG									326·	<u>03</u>	
נו	RILLING	METHO	D: 41/4 " 1D	WATER	LEVEL RE	ADINGS			GRO	JND SUR	FACE	ELEY	.:	
_			EM AUGERS	DATE	TIME	DEPTH			COO	RDINATES	S:			
	10.65	0.0)		سنعت	<u>-4.1</u>	-1	1.0			NORTH			
ī	OG. BY•	R CA	INNESTRA								EAST:			
	RILLER:								DATE	START	اللب ا	1190		
_	EATHER:			-		ADJ T			DATE	COMPL	ETE: _	- 14	190	
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<u></u>	SOIL DEPOSITIONA	1	SOIL DE	SCRIPTION	AND BAC	KGROWD		SI	MPLING	DATA		AIR M	ONI TORIF	NG .
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•		1.3	(3" BROWN SILTY	SAND SOME OF	ZGANICS, T	J 6231/	II	N	7/	IN SPOO	2		1	1
أس			+	7.00.01 55.00			├ -∤∙	!	/		-:			+
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Z		i	SANO TE Sm	M GRAJE L	200 ANG - 1	SUE PAID	Ħ	X	<i>//</i>	1	1	Ť	20.4	0
			מנו (שנדנתפיפג]][17	// 55- 2	2-4	9:35	0.1	20.4	/
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۶		 	ומשבים שמברני	E 5 4.2 (2) 4:	500ml - 10	}	╁┼	+\}	7)	110 5000	<u> </u>	+	+	!
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1	OUT-ASH	50	DENSE, 10YR 5/3	BROWN, SE	IND, (MI	EDIUM	l H	5	55-3	4-6	רעים	0.1	20.9/	9
7	-		GRAINS) TO FO	o sand To	<u> ここれにないた</u>	N PLAATIC	 - -	***	/	7	70000		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
_/		<u> </u>	SUICHT COMES	ON. SATURAT	ΈD		1	N	// 3"	0.1	100	70		<u> </u>
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ľ	- CUTWASH	>V	suseno - eno,	PITTED, FROM	TED , QUA	وتكاتاك	Į.	$1/\lambda$	4	6-8	14:57	101	20.9/	1
			GRAINS) TO E ? (DK BLACK SUF	CO SAND, To	<u> </u>	<u> </u>		N	//3"	0.1	1		1	1
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8 H			DE-145 10 VO 5/-	505 W . 0. W	- /MC 000			$\frac{\mathcal{N}}{\mathcal{N}}$		-	┼	1	-	╁
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			GRAINS) TO FE	CV <vtd dov<="" td=""><td>1 PA AST</td><td></td><td></td><td>N</td><td>7</td><td></td><td>1</td><td>i</td><td></td><td>Ť</td></vtd>	1 PA AST			N	7		1	i		Ť
ıL			CLICHT CONES	ON. SATURAT	ED.			$V_{\overline{A}}$	71 -	0,1	<u> </u>	<u> </u>	<u> </u>	!
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$^{\perp}$		5W						77				}		
9		SW	DENSE IOYR 5/2.				1.	V	14.	10.5	10:33	٥.	20.9	6
-		244		% GROVEL			125	⁄秋	1	10-12	20.33	<u> </u>	1./0	//
-			SUBANG, DOLOR	MITIC, CLAST	2) NON		1	DY.	3"	0.1	[[
۱ -			-CUSUL BOOK		= 1715 H.L.= V		十	N ₂		100	i		 	
L.					******			N.		SPOON				
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- (e	HEAWTUC	ew-Gw	DENSE 10 YES/1	GRAY AND		017EC	22	NV.	125-7	12-14	10:25	0.1	209	%
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5		†	CUE AND BUF					V _E	3"	0.1				
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BORING LOG

SOIL BORING NO.

Engineers	& Architects

SITE: SLAP

___ PROJECT NO. 20026

	\supset
BLG	-03

WATER LEVEL READINGS

GROUND SURFACE ELEV.:

4/4" ID HOLON STEM

DATE TIME DEPTH CASING COORDINATES:

NORTH:

EAST:

DATE START: 11/11/90

WEATHER: OJERCAST, NW BREEZE

PHYSICAL SETTING: TO POWD

WELL INSTALLATION: WT-103A

_				P. EL	NNETTRA				_	_	-	DATE	START:	_11	190	le a	_
					AST, NWBREEZE	PHYSICAL	SETTING:	ADJ A	150 100 	γ. -	•	WELL	COMPLE	LATIO	N: _M	T-10	314
	Ξ,	SOIL			SOIL DESC			-		•		LING E		1		NITORING	
	9 3	ENVIRON	MENT	uscs	DRILLING	COMMEN.	rs		B	N A	R	TYPE	MPLE INTERVAL	TIME	PIO	S/EEL	
					TO SLT NON PLAS	L SAMPLE	OHESVE LATURE	752	-	1	<u> 1</u>		SEE DO	EVIC			
	-16	L	_								1						
	'				BLIND DRILL EDR COLLARSE T	10 12.01 7	KENTINSI O VITOM	WAT.		-↓.	. .						
	-17				NO SAMPLE TAKE				_	_	_						
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	Don	idoli	Je	8	BORING	LOG				S	01L	BOR	ING 1	٧٥.
	Engineer	s & Arch	nitects SITE:	HIMCO DUMP	PRO	JECT N	10.	20	<u>>026</u>	<u> </u>	78-1	26-	>	
	식 火, 박 _OG BY: .	10 H	olume 350 Olum Stem Al NNSSTEA	X-EE- DATE	LEVEL F	DEPTH	CAS		COOR	Ε	ACE ORTH:	ELEY.	:	
·	ORILLER: NEATHER:			Brichd Physica	HNU RE	eacing NG: GRA	01	Pri	VELL	COMPLE	TE:	ייןי	140	<u> </u>
2	SOIL DEPOSITION ENVIRONMEN	USCS	! 1	ESCRIPTION LING COMMEN	_		8 1	SA		DATA SAMPLE I INTERVAL	TIME	AIR M	ONI TORII	NG EAD
-	EOLIN	OL-5M	1005E,2.543/2	v. daek cea ggavica, mois	クト RRON	D, SILTY	1 9	7	55-1	0'-2'	'		20.9/0	
-1	OUTWASI	A 5P	INTE Y/U SAN	o (medium is) To time odda	#\c	**************************************	<u> </u>	7777	3"	0.2 ppm 1N 500N		<u> </u>		
-z		€P	MEDIUM DENSE, EROWD, SAN	D (MEDIUM &	ue en e-	ede rid Teome	1 1		8 	2-4	1	0.2	20.9/	%
-3			515 T. F.	or term white	CAVEL (em-M. Blactic		ZZ	4	IN Proon				
- 4 	007484	5P	MEDIN TENE BROWN (107 (F-M, AUBANI CLAINS) TO C	27/3 YERY >A	LE TROY	M SAND	115	77/7/	3"	0.2	1626	0.2	20.90	96
 - 6			GRAVEL (DE P Trisut, NO DAMP	n Platie, il	16.ET.20:	-E\$1015.		NT/N	7	SPOON				
V	LI SALV-UC	5P	CHARTE CO	E 104R 6/2 LIEANG TANG RAINS) TO C LAANIC EXACT WEANG TOLO	e sand.	<u> </u>	12		3"	6-8'		0.2	20.9	10/6
-8			Plastic, Non	Conféire, Pí	MP-MOI	ZT			3	stoon				
. q		5P	CRAILE	Soband-And, F TON SAND! CRAVEL (Sim	5000 50 000 50 - 4116 - 51	16 8 (30)	S		3"	6'-10' 0.2	16:57	0.2	20.9	%
	=		NONA ATTE	NONCORES				N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/	1	in Spood				
	OUTWAS H	50	GRAIN' ARE	YEEL BROWN F. TOWARDS S. YEARL-ANG. O	STAM DE	15.50N	25	***	35-6	10'-12' O1Zpm	30.TI	0.2	20.9/	%
- II			GRANITICKINE	- ANG.) NOW! SATURATED.			,			1N 1500H				
2))="/##	ક્ષ	MED DEMY - DEMY (F.M. LIEA CRAINY)	2 20A2 - 2	ACTE!	<u> </u>	20	W W W W W W W W W W W W W W W W W W W	55-7 3"	121-141 0.2	17:28	0.2	206/	%
Ĭ	<u> </u>		NOU COSES	UE, SATURA	TE		Ì	X	1	IN POON	寸	1	<u>;</u>	

BORING LOG

SOIL BORING NO.

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			IP H	oicod ST	rm_	WATER DATE	LEVEL	READINGS DEPTH		SING			ND SURF				
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				annestra	 .			- —	-		-	DATE	START:	ـــــــــــــــــــــــــــــــــــــ	1119	9	
		ORILLER: _						LEVE	<u> </u>		-	DATE	START: COMPLE	TE: _	rile	190	
	1	VEATHER:.	OVER	CAST, NW	MN3,45	PHYSICAL	SETT	ing: <u>Gra</u>	22		•	WELL	INSTAL	ATIO	بط الا	7-10	7AV
)TH 6567	SOIL DEPOSITIONAL	11505	so	DIL DESCR				L			PLING D		,		IITORIN	-
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				ATER LEVEL REAL	DINCS		_=	COOL	NO CURE	===			
•			Co (N Co)			ASIN			ND SURF DINATES:	:			
,			AUGER				_			ORTH: AST:_			
			NNESTRA -						START:	_11-	9-90		
•	VEATHER: _		* • • •	YSICAL SÉTTING:	ADJACE	ر جرو			COMPLE				
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EPTH FEE	SOIL DEPOSITIONAL ENVIRONMENT	uscs	SOIL DESCRIPT DRILLING CON		-	11		-		!	_	10- 2	7
	DIVIRONAENT					N	AR	41	INTERVAL	TIME	<u>!</u>		GEGE
•	<u> </u>	25	MO 10 YR 3/2 VE GRAYM	-סניפאיויגא שנר	5M= 1	13	XX,	احج	0-2	15:03	4.0	206	0
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3			F-M TE SILT TE D					3"	0.6	0.6	<u> </u>		
					·	\prod							
						ΪŤ	7						
4	 	4.0	m Inva 4/6 TX YELL	Drugh & COUN. 5	ONA	 	12	<u> </u>				20.6/	
	ţ	5 9	TEM TEELS		<u> </u>	計	X/	35-3	4-6	15:35	0.5	20.6	0
5	<u> </u>		CALLED SERVES	P Ch salvi, Ivil		F	V	3"	0.7	٥٠)			
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			PLACK GRAILTA . L.C.	- IMEAC Franc	<u>~</u>	1	*/	3"	3.4		5.0		
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BORING LOG

SOIL BORING NO.

Engineers	& Architects
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SITE: SUPER FUND PROJECT NO. 20026

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7-1-2-2-1	SAND TURNING FINER NEAR TIP	-+-	1	₹~		1	1		-78.	
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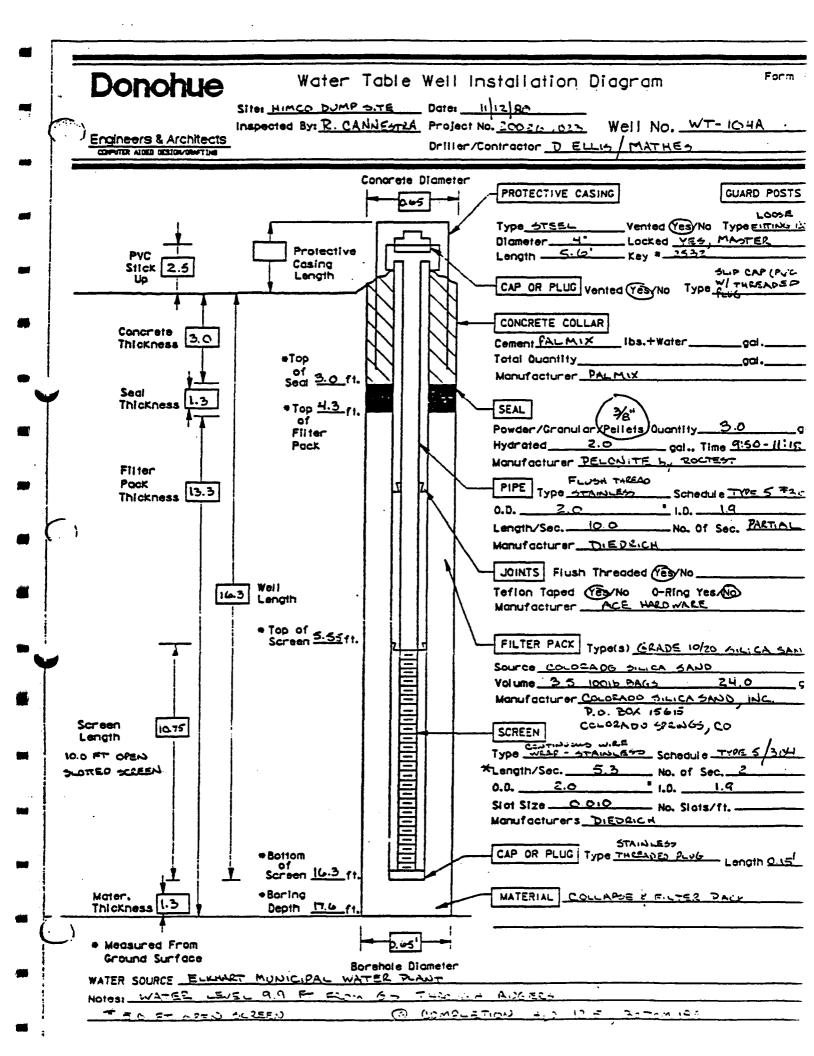
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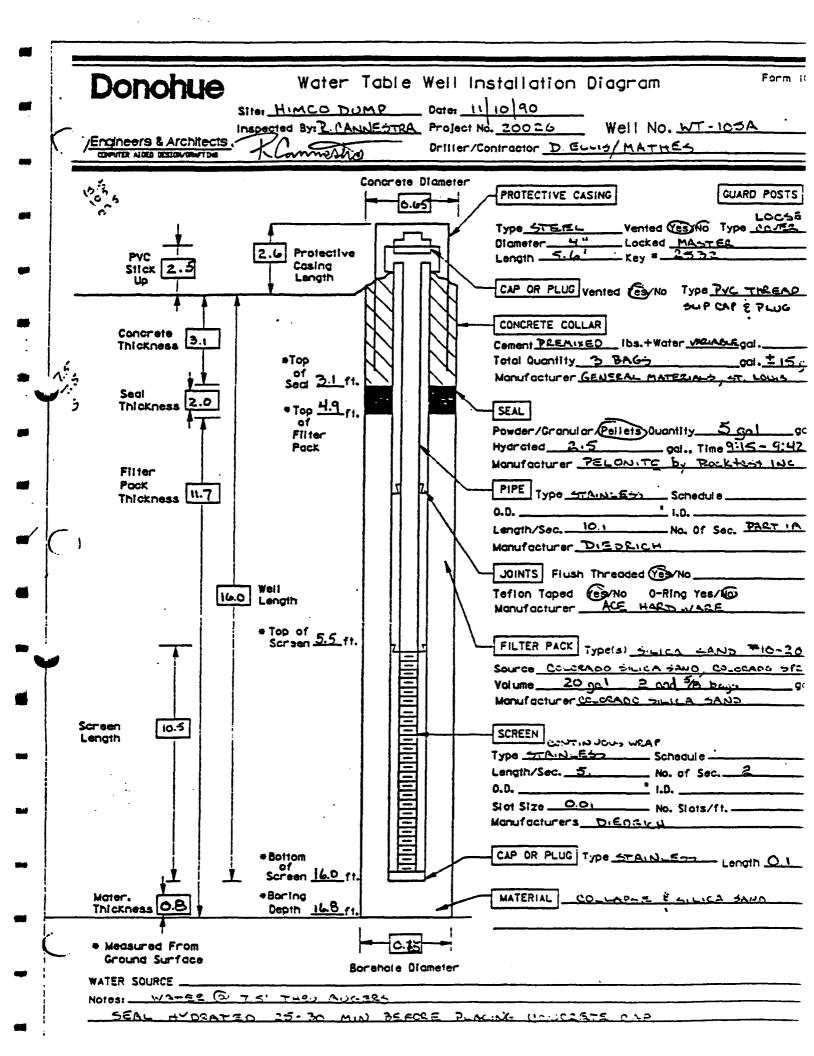
APPENDIX B WELL CONSTRUCTION DIAGRAMS

	Donohue	•		Installation Diagram	For
				NOVEMBE 17 1990	w/ =
1	Engineers & Architects	S Inspected by:		ect No. 20026, c.c.3 Well No. 1	W12101/4
	COMPUTER ALDED DESIGNATIONS				
			Concrete Diamet	PROTECTIVE CASING	GUARD POS
			0.65		, ieee
				Type CTEEL Vented Ve	
	PVC T	2.6 Protective		Length Key *	232
	\$11ck 245	Length	ALIK.	CAP OR PLUG Vented (Yes/No	かり かいじ しっぐ Matht Clarent
-	+		$M \mid M$	Vermed (tear) to	PLUE
	Concrete [$M \mid M$	- CONCRETE COLLAR	
	Concrete Thickness	-7	M M	Coment PALMIX 150 Ibs.+Water	
	1	of 30 ft		Total Quantity Manufacturer <u>PALMIX</u> (PLE M	001
	Seal 12	1			
	Thickness 1.2	* Top 4.2 ft		SEAL 3/2 Powder/Granular(Pellets)Ouanti	
	· [Filter Pack			ty <u>5.8</u> ., Time <u>16:50 - C</u>
	Filter	1 44		Manufacturer TELONITE by	
	Filter Pack			PIPE Type STAINLESS SC	
	Thickness 13.3			0.0. 2.0	01.9
	·		\	Length/Sec. 10.0 No	
				Manufacturer DIE DRICH	
				JOINTS Flush Threaded (es)	10
		Well Length		Tefion Taped (es)No 0-Rin Manufacturer ACE HARD	g Yes.400
	l į	, Too of		Midnut detarer	
	_	*Top of 5.4 ft	. 7 4	FILTER PACK Type(3) SILICA	SAND + in.
				Source COLORADO SILICA SA	WD
				Volume 3.25 10015 BAGS	
				Manufacturer <u>CoLO2AOC جاند</u> کمدم۶۸۵۵ خدد	
_	creen 10.9			SCREEN STAINLESS	
	10TE: 10.0"			Type STEEL CONTINUOUS WEBCHO	
C	OF ACTUAL			Length/Sec. 5.3 No. o	of Sec. 2
<	oten screen			0.D. <u>£.8</u> 1.D Stot Size <u>O C:O</u> No. 5	
				Manufacturers DIEDRICH	31013711
				THEADED	9
		*Bottom		CAP OR PLUC Type BLANK CA	Length _0
	12	Screen 16.3 ft			=
	Mater. Thickness 1.2	Depth 17.5 ft		MATERIAL COLLAPSE AND	FILTER
_	1			PACK	
	 Measured From Ground Surface 		ره د	•	
		HART MUNICIPAL H	Borahole Diamete ソムナミス うしらこ		
	Notes:				

Donohue Water Table Well Installation Diagram Form Sites HIMCO DUMP SITE Date: 11-Inspected By: R. CANNESTRA Project No. 20026 Well No. WT-102A Engineers & Architects Driller/Contractor D. ELLIS / MATHES RCamestra CONFUTER ALDED DESIGNATING Concrete Diameter GUARD POSTS PROTECTIVE CASING اكعات LCOME Vented Yes / No Type / A2 Type STEEL 411 YES MASTER Digmeter_ Protective 5.6 PYC Length -Casing Stick 25 Langth CAP OR PLUG Vented (Tes/No Type TVC 4-19 UND WTHEEADED PLL CONCRETE COLLAR Thickness 3.0 Coment PREE-Mix | Ibs.+Water_ #Top Total Quantity 2 BAGS I 7 sol sed 30ft. Manufacturer GENTEAL CONTRACTORS ST. wis Missing Sagi Thickness 1.5 + Top 4.5 ft. SEAL of Powder/Granular(Pellets)Quantity_ Filter Hydrated Hon # 3 ___ gal., Time 17:05-17:35 Pack Manufacturer <u>PELONITE</u>, <u>ROCKTEST</u>, INC Filter STAINLESS Pack PIPE Type TEEL Thickness 12.3 _ Schedule_G2ADS 1.0. 1.9 0.D. 2.0 -No. Of Sec. PARTIAL Length/Sec. 10.1 Manufacturer_DIED2.CH JOINTS Flush Threaded (es)No_ Well Teflon Taped (es/No 16.0 0-Ring Yes/NO Length Manufacturer ACE HARDWARE Top of 5.25 ft. FILTER PACK Type(s) SILICA SAND 710-20 Source COLORADO SILICA SAND CO Volume 276 loc 15 BAGS Manufacturer COLO SILICA SAND CO Coloras sprinces, colo. Screen 10.35 SCREEN CONTINUOUS WIRE WEAP TYPE 5 Length Schedule GRADE 304 ACTUAL صوالا جدوديا Length/Sec. <u>5.3</u> No. of Sec.____ 10.01 1.0. 0.D. __ **でいていい**の - No. Stats/ft. wies went Slot Size O O.O Manufacturers DIEDRICH STAINLESS CAP OR PLUG Type STEEL **₽**Bottom - Length <u>0.15</u> Screen 16.0 ft -Boring MATERIAL COLLAPSE & FILTER SAND Motor. Thickness 08 Depth 16.8 ft ی س · Measured From Ground Surface Borehole Diameter WATER SOURCE ELKHART MUNICIPAL WATER PLANT NOTOSI BORING EXTENDED TO THE RATHER THAN ILLE TO BLOOD WHEN PULLING AUCEDS

Water Table Well Installation Diagram Donohue Form Site: HIMCO DUMP Inspected By: R. CANNESTA Project No. 20026 Well No. WT-1034 Engineers & Architects Driller/Contractor D. ELLIS/ MATHER COPUTER AIDED DESIGNARATING Concrete Digmeter PROTECTIVE CASING GUARD POSTS C 65" حنسيمين Type<u>グ、</u>EEし _Vented YasyNo Type www. a. Digmeter 4"
Length 5.6 Locked VES MASTER Protective - Kay # -PVC Stick 25 Casing Length CAP OR PLUG Vented Tes No Type WITHEARE Up CONCRETE COLLAR Concrete 3.0 Coment PREE-Mix Ibs.+Water___ Total Quantity__ **⇒Top** of 3.0 ft. Monufacturer GENERAL CONTRACTORS هر ودرها الد ₹ Top 4.0 Thickness 11.0 SEAL žε of Powder/Granular Pellets Quantity 3 GAL Filter Hydrated 2.5 gal., Time 12:08 -14.1 Pack Manufacturer PELONITE by RUCKTEST Filter FLUSH THERACED TYPE 5 Pock PIPE Type TAIN-E- Schedule GOADE 30 Thickness 13.0 0.D. <u>2.03</u> -No. Of Sec. PACTIAL Length/Sec. IC-O Manufacturer DIEDRICH JOINTS Flush Threaded Yes/No_ Weil Tefion Taped Yes/No 0-Ring Yes/No 160 Length Manufacturer_ Top of 5.25 ft. FILTER PACK Type(s) SILICA SAND Source Colocado Silica SAND Volume 2.5 10015 BAC-Manufacturer COLCEADO SILICA SAND Colorado strings colo. Screen SCREEN COUTINGS MCE 10.75 Length Type WEAP STAINLESS Schedule GCADE 304 Length/Sec. 5.3 _ No. of Sec._ 2.04 Stot Size O.O.C - No. Slots/ft. -Manufacturers DEIDRICH うてんいしたかっ CAP OR PLUG Type THERADED PLAT Length O.15 mottod • Screen 16.0 ft. +Boring MATERIAL COLLAPSE & FILTER PACK Mater. Depth 17.C Thickness · Medsured From Ground Surface Borahole Diometer WATER SOURCE ELKHART MUDICIPAL WATER PURNT



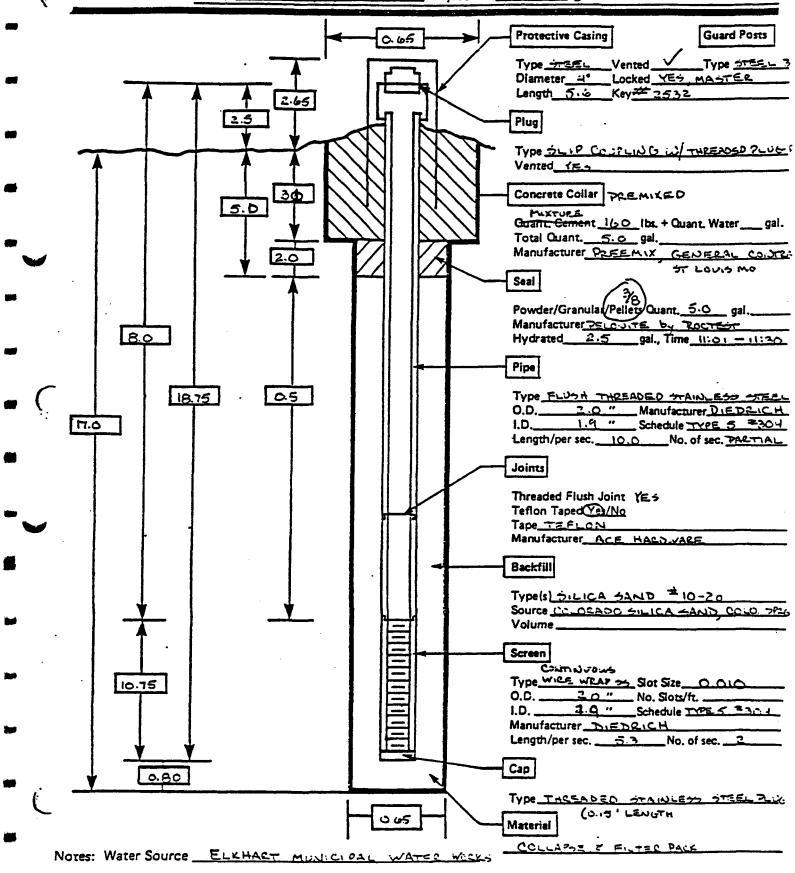


OBSERVATION WELL INSTALLATION DIAGRAM

Well No. WT 106A

Site: HIMCO DUMP ELKHART IN Date: NO. 1990

By: R. CANNESTRA / MATHES Project No. 20026.023



WATER LEVEL IN BOSEHOLE PRIOR TO INSTALLATION AT O BELOW GO

APPENDIX C
DAILY ATMOSPHERIC MONITORING LOGS

- Donohue

Atmospheric Monitoring Log Field Safety

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Project Site HIMCO DUMF Health & Safety Officer A. KIRYKOWICZ Project Number 48 20026.023 Level of Protection D												
Project Nu	mber	ie 200	026.0	23		Level of P	rotection_D					
Level of A	ction			···								
Description	of site (v	veather, t	emp, soil	condition	S) PARTL	Y CLDY	LT NW BREEZE 33					
BACK	<u> Ceroun</u>	ם אטי	READI	<u> </u>	13 com	·····						
Date	. Site	Depth	RAD OVA	HNU	OXGEN	LEL	Comments					
1113 8:15	WT-104A	17	0.0	05	20.6	00	UNCAPPING AUGERS					
1412 9:10		15	0.0	0.3	20.9	06	PULL FIRST AUGER FLIGHT					
11/2 4:22		10	0.0	0.3	20.9	00	PUL SECONO AUGEL FLIGHT					
112 9.42	WT-104A	15	0.0 .	0.3	20.5	0/0	DULL THIRD AUGER FLIGHT					
1412 16:20	WT-101A	15	0.0	٥.٤	21. 1	0/0	AND BACKGROUND O.2 FULL FIRST AUGER FLIGHT					
1628	WT-101A	10	9.0	O. 2	21.1	%	PULL SECOND AUGER FLIGHT					
	WT-101A	5	ა.ი	0.2	21.1	90	PULL THEO AUGES					
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Additional Notes: BACK GROSSID HN 0.3 ppm												

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Time Site Depth OVA HNU OXGEN LEL Comments	Date /			RAD				
11:41 WT-1034 15 0 0 1 20.9 0 PULLING AUGERS 11:49 WT-1034 10 0 0 1 20.9 0 PULLING AUGERS 200 FLIGHT HISE	Time	. Site	Depth-	OVA	HNU	OXGEN	LEL	
		W7-103A	15	0	01	209	0	137 \$61647 H35 4 C
12/22 W-103/A S.C. O 1 20 1 O PU -LING AUGERS H_5: C	1111111111	WT-1034	10	0	01	20.9	0	PULING RUCKES 200 FLIGHT HESE
	13:02	W1034	5 .0		01	20.7	0	PU -LINU AUGERS 37 FLICIOT HEST
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aditional Notes:	dditional	Notes: _						

Donohue Engineers & Architects

Project Site	HIMC	O DUMI	2.75			lealth & S	Safety Officer A. KIRY KOWICZ
Project Nu	mber <u> </u>	20026					rotection_D
Level of A	ction				•	···	
Description	of site (v	weather, 1	emp, soil	condition	s) CLEN	B, 35	- 45, SOILS MOIST - SATURATED
HN:	3KGEN	0.6/1	ASTEC	<u>k</u>			
Date Time	. Site	Depth	MW. EAG	HNU	OXGEN	LEL	Comments
11/10 8:20	WT-105A	ان.	0	0.6	20.4	0	READING TAKEN IN BOREHOLE & WORKING
1410 8:35	WT-105A		0	0. 2	20.4	0	INSTALLING WELL PULL FIRST AUCER
	WT-105A		0	0.2	20.4	0	" " SECOND AUGER
N10 9:08	WT-105A			0. j	20.5	0	THIER AUGEL
					·		-
							_
						_	
						•	
			·		,	*	
			•				
		•					
Additional	Notes: _						
							
Signature _	KU	mo					Date

Engineers & Architects	Field Safety	
Project Site HIMCO DUMP SUPERFUND SITE	- Health & Safety Officer ANYA KIRYKOWICE	
Project Number 20026	·	
Level of Action C DURING WELL INSTALLAT		
Description of site (weather, temp, soil conditions) OVE		

Date Time	Site	Depth	OVA	HNU	OXGEN	LEL	Comments
11/9:40	\$ 100 \$ 100	16		0.2	20.1	0	ω ₂ ∞οο
11/4 9:51	WT 106	17		0.2	20.5	0.0	£07 00€
	ひったん	WELL	CONST.	0.4	209	00	(O ₂ C
11/9 10:45	11	SCAE Aust		0. 2	20.6	ð. c	Ce- = 0
11/4 10:53	ננ	SONE WOOK		0.2	20.9	0.0	COZ = C (UTING > SIMILAR TO THISE WITH SOLVENT COPOR
			<u> </u>			•	·
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Additional Notes:	
gnature Roland & Connection	Date 11-9-90

Donohue Engineers & Architects

Project Nu	ımber <u> </u>	20026.					rotection_D
Level of A		woodban de			-1 PACTE	- 01 DY	CALM 35°
		719049					
Date Time	Site	Depth	PAD OVA	HNU	OXGEN	LEL	Comments H24
	T-5	1.5-2.5	0	1.0	21.2	0	O ONLY AGE TO PURH TURE
1 3.0.3	T-5	1.5-4.5	0	1.0	21.1	0	O SAMPLE SURE OUT OF TUR
11/13/11:10	0-15	2.0-5.0	0	1.0	21.1	_ 0	S"TOPEOIL & ~ 1.0" of white cover
11/13 11:30	0-15	2.0-5.0	0	0.2	21.1	0_	SWITCH HUL BGEND O.3 C TUBE MAY CONTAIN WASTE
1413 11:55	K-14	1.5-4.5	0	i.0	21.1	_0	SCIL 0-4", WHITE 4"- + 30 O BELOW 3' POTENTIAL WASTE
1113 12:08	K-HD	1.5-4.5	٥	1.0	21.1	0	0 14 0
11/13/14:09	D-24	1.0 -4.0	6	1.0	21.2	G	SOL 0-5", CALCIUM SULFATE 3"-1.0"
						•	
							<u> </u>
						_	
Additional	Notes:						



TECHNICAL MEMORANDUM NUMBER 14

DATE:

May 1, 1991

TO:

Vanessa Harris, Site Manager

CC:

Marcia Kuehl, RI Lead

Roman Gau, Project Manager

Mike Crosser, TSQAM

FROM:

Anya Kirykowicz Dave Richardson

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J

Himco Dump RI/FS

Donohue Project No. 20026.024

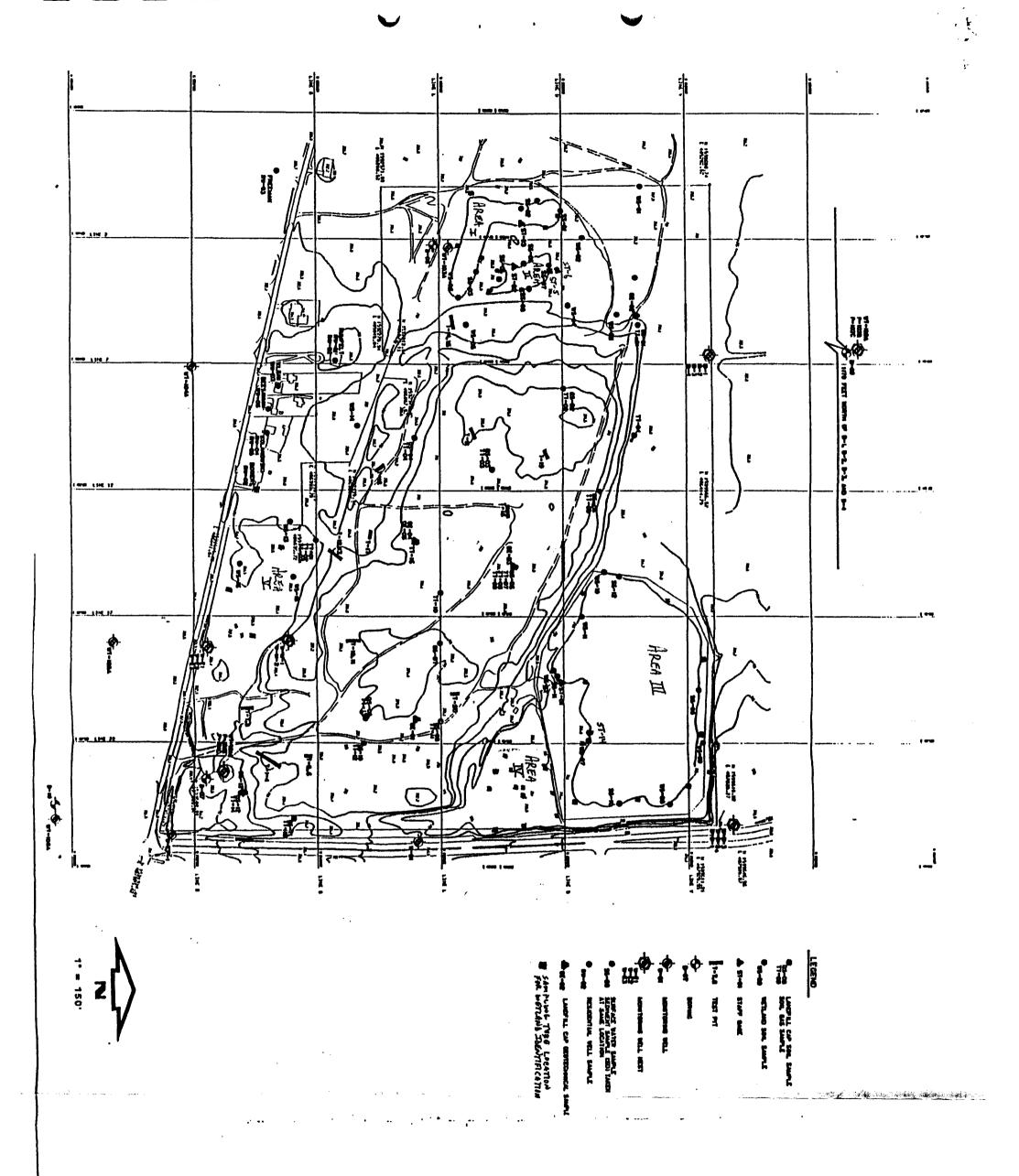
WETLANDS ASSESSMENT AND IDENTIFICATION

Introduction

On October 22, 23, and 24, 1990 Donohue & Associates, Inc. conducted an on-site wetlands assessment and identification at the Himco Dump Superfund Site as part of the RI Work Plan. The delineation was conducted by Dave Richardson and Anya Kirykowicz. Three suspected wetland areas were designated as Northwest Wetland Area, Wetland Remnant, and Gravel Pit Wetland Area. The location of these areas is presented in Figure 1.

Methods

As outlined in Section 4.6.1 of the Final Field Sampling Plan, Himco Dump RI/FS Elkhart, Indiana, three essential characteristics were used to identify wetland areas. These characteristics are: hydric soils, wetland hydrology, and hydrophytic vegetation. These characteristics and their technical criteria are described below. The approximate boundaries between wetland and upland areas were identified using methods prescribed in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands" (Federal Interagency Committee for Wetland Delineation, 1989). The Disturbed Area Wetland Determination Method was used, with the hydrophytic vegetation assessment taking the lead. Sampling tube cores were used to examine the soil profile for hydric soils and wetland hydrology. An assessment of hydrophytic vegetation was made at each sampling tube core. The following equipment was used: soil sampling tube, dead blow hammer, site map, field notebook, Munsell Soil Color Charts, flagging tape, wooden lathe, camera, plastic bags, field guides for plant identification, USGS topographic map, Hydric Soils of the United States List, and an aerial photograph.



MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



Wetland Hydrology

Wetland hydrology is defined as permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. The wetland hydrology criterion is met if a site is inundated or saturated to within 1.5 feet below the surface, based on the soil drainage characteristics, for at least one consecutive week during the growing season in an average rainfall year (Federal Interagency Committee for Wetland Delineation, 1989). This criterion is the least exact and the most difficult to assess in the field.

Hydric Soil

Hydric soils are defined as soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part (U.S.D.A. Soil Conservation Service, 1987). An area has hydric soils when the National Technical Committee for Hydric Soils criteria are met. These criteria relate to soil types, soil drainage characteristics, water table levels and frequency of flooding or ponding.

Hydrophytic Vegetation

Hydrophytic, or wetland, vegetation is defined as macrophytic plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Federal Interagency Committee for Wetland Delineation, 1989). The U.S. Fish and Wildlife Service publishes a list of plant species that occur in wetlands by region. Each species in the list is given an indicator status reflecting the range of estimated probability that it may occur in a wetland versus non-wetland area across its entire distribution. These indicator categories are listed below:

- o Obligate Wetland (OBL). Occur almost always (estimated probability >99%) under natural conditions in wetlands.
- o <u>Facultative Wetland (FACW)</u>. Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
- o <u>Facultative (FAC)</u>. Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
- o <u>Facultative Upland (FACU)</u>. Usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability (1%-33%).
- Obligate Upland (UPL). Occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in non-wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the National List.

The hydrophytic vegetation criterion for wetland identification is met when more than 50 percent of the dominant species at a given site are obligate, facultative wetland or facultative species.

Deviations

The three suspected wetland areas were renamed in the field. The Northwest Wetland Area was divided into Area I and Area II. The Gravel Pit Wetland was designated Area III. The Wetland Remnant was designated Area V. An area immediately south of the gravel pit was designated Area IV. This area was added to the field investigation based on visual observations. The study areas are shown on Figure 1.

Summary of Results

Sampling tube cores were used to examine the soil profile for hydric soils and wetland hydrology. A total of thirty-nine sites were chosen for soil sampling, representing the various conditions on the site. The vegetation was sampled at these 39 sites. Some of the plant species were not identified in the field but were collected, tagged, and identified offsite. Field work was conducted in late autumn, making identification difficult. The locations for the 39 sites are shown on Figure 1.

The only area identified as a wetland was Area IV. All of the other locations were non-wetland based on existing normal conditions or due to fill materials that were placed in close proximity to open water.

Hydrophytic vegetation identified in these wetland areas included: Typha angustifolia (Narrow-leaf Cattail-OBL), Carex sp. (Sedge sp.), Equisetum hyemale (Rough Horesetail-FACW), Solidago gigantea (Giant Goldenrod-FACW), Salix sp. (Willow sp.), Aster novae-angliae (New England Aster-FACW), and other Solidago sp. and Aster sp.

AK:llw

A/R/HIMCO/AB9

TECHNICAL MEMORANDUM - NO 15



DATE:

January 25, 1991

TO:

Vanessa Harris - Site Manager

CC: ·

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSQAM

FROM:

Tom Puchalski Anya Kirykowicz

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump RI/FS

WETLAND SOIL SAMPLING

Introduction

Sixteen soil samples were collected from three suspected wetland areas at the Himco Dump Site on October 21, 22, 23, and November 7, 1990; six from the Northwest Wetland Area, four from the Wetland Remnant, and six from the Gravel Pit Wetland Area (Figure 1). These soil samples were collected to investigate for possible soil contamination associated within these possible wetland areas. Sampling locations were selected to include what were suspected to be areas of most likely contamination. These areas included suspected wetland areas receiving drainage from the landfill cover as determined by aerial photography and field observations, and areas of apparent stressed vegetation. Soil samples were composited at each location from 0 to 18 inches or shallower where the auger met with refusal. Wetland soil sampling for chemical analysis was performed by Eric Slusser and Tom Puchalski of Donohue & Associates, Inc.

Methods

Section 4.6.4 of the Final Field Sampling Plan, Himco Dump RI/FS, Elkhart, Indiana, describes the wetlands soil sampling procedures. A hand auger was used to collect the sample at each location. After gathering soil to the required 18-inch depth, grab samples were retrieved from the sample bowl and put in 4-oz. glass jars for volatile analysis. These jars were filled with no head space remaining. The remaining soil was classified (USCS), the color identified using a Munsell Color Chart, and examined for obvious signs of contamination. This information was recorded on a soils data form (Appendix A). A stainless steel spoon was used to stir the remaining soil until a homogeneous mixture was obtained. The mixture was divided into four equal size quadrants. Portions were taken from each of the four quadrants to fill the remaining sample jars.

The hand auger, mixing spoon, and composite bowl were decontaminated between sampling points using an alconox and tap water wash, a tap water rinse, an isopropanol rinse, and two deionized or distilled water rinses. Isopropanol rinses were captured in a 5-gallon bucket and covered for eventual discharge into the on-site frac tank. A photograph was taken of each wetland soil sampling location.

Deviations

The sixteen sampling locations were selected prior to the wetland assessment and identification. Only one of the locations designated as a wetland sample (WS-#) was from a wetland location. WS-07 was located near ST-14 (sampling tube-14) of the wetland identification procedures. ST-14 met all three of the wetland criteria - hydric soil, hydrology and hydrophytic vegetation.

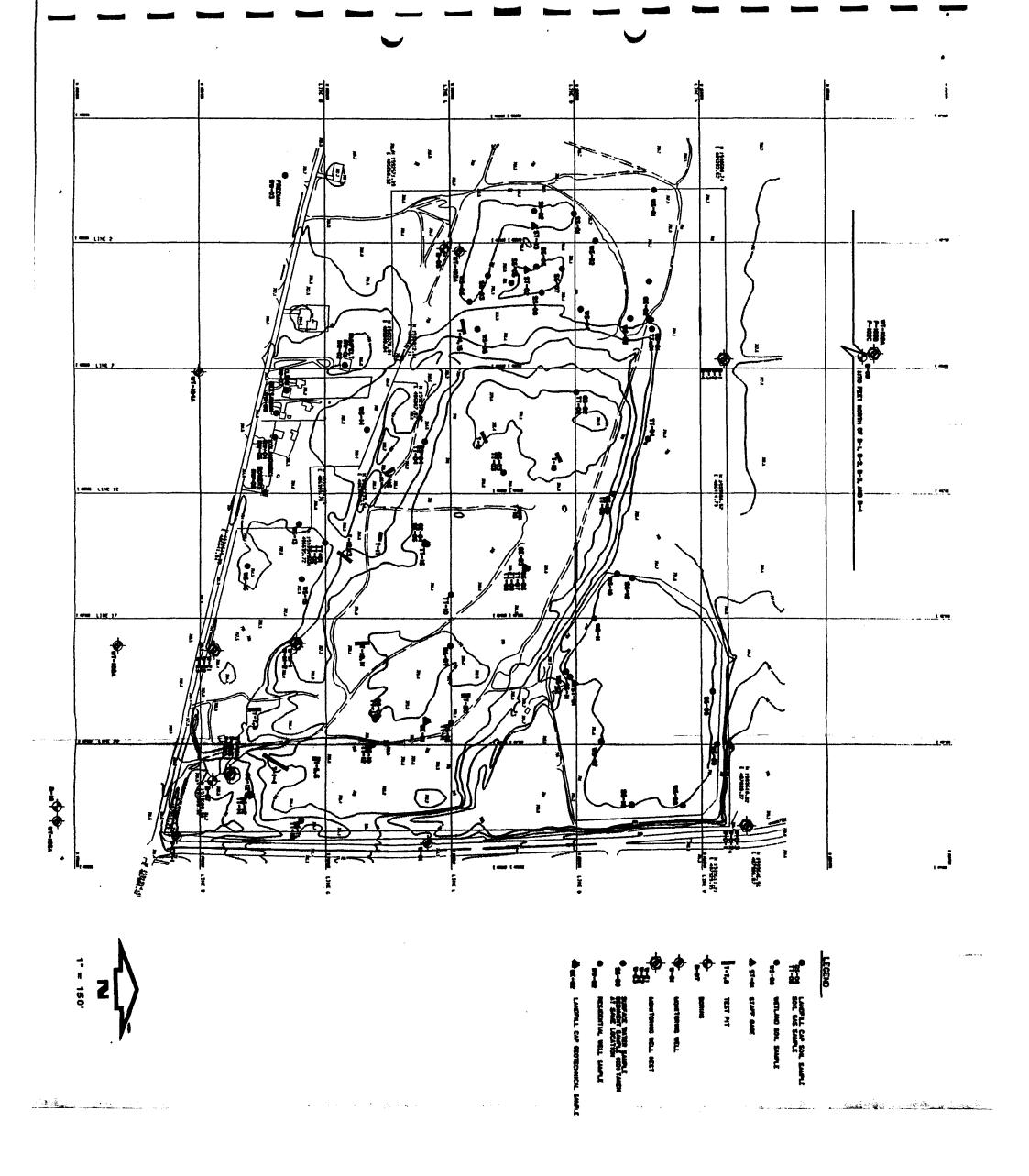
A stainless steel hand auger was used to collect the soil sample rather than a sampling tube as was described in the sampling plan. Besides being more labor intensive, a sampling tube does not collect sufficient soil volume to fill the required sample jars. Several pushes of the tubes would have been required at each sampling location. With the hand auger, sufficient sample volume was collected with one run from 0 to 18 inches.

Summary of Results

Sixteen soil samples for chemical analysis were collected in suspected wetland areas. Sample locations are provided in Figure 1. Wetland Soil Data forms are provided in Appendix A. A summary of wetland soil sampling locations, suspected wetland area, and materials encountered is provided in Appendix B.

TP:AK:ds

A/R/HIMCO/AB3



MAY 1991

FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA



APPENDIX A SOILS DATA FORMS

Donohue	Soils Data Fo		Soil Sample Area Soil Subsample	Northwest 5-1
Engineers & Architects	& Scientists Site	Himo Dump		
DATE 10 21 90 TIME 1625 COLLECTOR TO		-		
SAMPLE DEPTH	0-18"			
PHYSICAL DESCRIP	PTION OF SUBSAM	IPLING LOCAT.	ION: North end	of
DESCRIPTION OF SI	JBSAMPLE: LOYE	34/1 Dark gn	y silty soud (s)	7), lou
ANY OTHER CHARA	CTERISTICS OF N	OTE: 1" of m	oss at surfare	, roots

TIME	DATE 10 3 90 TIME 1645 COLLECTOR TOM DUCHALSK! ERIC SLUSSER SAMPLE DEPTH 0-18" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: South evol of Montainest Reniment in prairie. DESCRIPTION OF SUBSAMPLE: 1048 6 1 Light gray 51 ty Same (3 H) Sau Cook, Marist	Donohue	Soils Data Form	Soil Sample Area Worthwast
TIME 1645 COLLECTOR TOM PUCHALSKI ERIC SLUSSER SAMPLE DEPTH 0-18" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: South part of Northwest Reminant in prairie. DESCRIPTION OF SUBSAMPLE: 1848 611 Light gray 51/19 South (3M)	TIME 1645 COLLECTOR TOH PUCHALSK! ERIC SLUSSER SAMPLE DEPTH 0-18" PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: South evel of Northwest Renimon t in prairie. DESCRIPTION OF SUBSAMPLE: 1048 6 Light group silty early (3H) Sout cool, pariet	Engineers & Architects &	& Scientists Site Himco	Dump Project No. 20036.
PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: South and of Northwest Renimont in Prairie. DESCRIPTION OF SUBSAMPLE: 104R 6/1 Light gray 5/14 Roud (3H)	PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: South evid of Northwest Rominous in prairie. DESCRIPTION OF SUBSAMPLE: 104R 6/1 Light gray sity sand (3H) OUR COLD, Marist	TIME 1645 COLLECTOR TO	<u> </u>	
DESCRIPTION OF SUBSAMPLE: 104R 6/1 Light gray Silty Soul (3M)	DESCRIPTION OF SUBSAMPLE: 1048 6/1 Light gray Silty Small (3M)	SAMPLE DEPTH	0-18"	·
DESCRIPTION OF SUBSAMPLE: 104R 6/1 Light gray Silty Soul (3M)	ON CON, MANIST	PHYSICAL DESCRIP Northings Roning	TION OF SUBSAMPLING LO	OCATION: South pyd of
	ANY OTHER CHARACTERISTICS OF NOTE:			

Donohue	Soils Data Form	Soil Sample Area Northu Soil Subsample WS-O
Engineers & Architec	ts & Scientists Site Himco	Dump Project No 2007
DATE 10/22/90)	
TIME <u>857</u>	-	
COLLECTOR EX	ROTHER DOWNS DM PUCHALSKI	• •
SAMPLE DEPTH	0-6"	
SAMPLE DEPIH		
		•
	•	
arra.		
DESCRIPTION OF fine grained 60	SUBSAMPLE: 10 4R 3/1 1 1970 Soul 4070 Silt, mais	long dark avery Silly Sand K t, low odh, nocts.
DESCRIPTION OF fine grained 60	SUBSAMPLE: 10 4R 3/1 1 970 9000) 4070 Silt, mais	long dark area Silly Sawa K t, low ooh, nocts.
DESCRIPTION OF fine grained 60	SUBSAMPLE: 10 4R 3/1 1 9% Saw 40% Silt, mais	long dark aver, Silty Sand K t, low odh, nocts.
ANY OTHER CHAR	PACTERISTICS OF NOTE: Re	long dark avery Silty Sawa & t, low och, norts.
	PACTERISTICS OF NOTE: Re	
ANY OTHER CHAR	PACTERISTICS OF NOTE: Re	

Donohue	Soils Da	ata Form	Soil Sample Area Mark
			Soil Subsample Ws-
Engineers & Arch	itects & Scientists	Site Himes Dunp	Project No. 2002
DATE 10/22	92		
TIME <u>9:4</u>	ວ	·	
COLLECTOR	Fric Slusser		
	Dorothea Do	בוואא	
·			
SAMPLE DEPT	H		
			1
MINOTOLI DEC		36 4 3 MY DYG Y 06 4 M	<u> </u>
AUTOICAL DES	CRIPTION OF SUI	SSAMPLING LUCAT	ION: Flat area
20 VH VAN	CRIPTION OF SUP	BSAMPLING LOCAT	ION: <u>Flat area</u>
30 yets yar	ds schiff wif	tree line and Lo	ION: <u>Flat area</u>
30 yets yam	ds schiff wif	tree line and Lo	ION: <u>Flat area</u> yends west of lon
30 yets yar	ds schiff wif	tree line and Lo	ION: <u>Flat area</u> yends West of Inc
30 yets yar	ds schiff wif	tree line and Lo	TON: Flat area yards West of lan
30 yets yar	ds schiff wif	tree line and Lo	TON: Flat area yards west of lan
30 yolf yar	ds schiff wif	tree line and Lo	TON: Flat area yards West of In
30 yde yan	ds seemstwelf	tree line and Lo	yeards West of lan
DESCRIPTION (OF SUBSAMPLE:	7.5 YR 514 Br.	en Silty send 0-11
DESCRIPTION (OF SUBSAMPLE:	7.5 YR 514 Br.	ena Silty Stad 0-11 1114, Ism tah roots Silty Stad (SM) f
DESCRIPTION (OF SUBSAMPLE:	7.5 YR 514 Br.	en Silty send 0-11
DESCRIPTION (OF SUBSAMPLE:	7.5 YR 514 Br.	ena Silty Stad 0-11 1114, Ism tah roots Silty Stad (SM) f
DESCRIPTION (OF SUBSAMPLE:	7.5 YR 514 Br.	ena Silty Stad 0-11 1114, Ism tah roots Silty Stad (SM) f
DESCRIPTION (SM) fine 5'	OF SUBSAMPLE: _ Size of the si	7.5 YR 514 Br. 1 35% silt mo YR 510 Greaths	yeards west of language of lan
DESCRIPTION (SM) fine 5'	OF SUBSAMPLE: _ Size of the si	7.5 YR 514 Br.	yeards west of language of lan
DESCRIPTION (Sim) fine 5/	OF SUBSAMPLE: _ Size of the si	7.5 YR 514 Br. 1 35% silt mo YR 510 Greaths	yeards west of language of lan
DESCRIPTION (Sm) fine 5/	OF SUBSAMPLE: _ Size of the si	7.5 YR 514 Br. 1 35% silt mo YR 510 Greaths	yeards west of language of lan

Donohue	Soils D	ata Form	So	il Sampl	e Area No.
				_	nple <u>الد</u> ع
Engineers & Archite	ects & Scientists	Site Himco	Dunp	Proje	ect No. 2
DATE <u>lolazi</u>	73				
TIME					
COLLECTOR _	Eric Slusser				
	Dorothes Do	7 W 1			
	·				
SAMPLE DEPTH	0-18"				
					•
				_ 🛌	100
PHYSICAL DESC					
75 years house h			vest of	I Gad till	TITIEM 44
40 yeard east Green house h		b present	ver of	I Gad till_	TITIEA 44
Green house h			vest of	I Gad till	Tillea 44
arec house h			ver) of	I Gad till	Tillea 44
Gree house h			ver) of	I Gad till	Tillea 44
arec house h			vest of	I Gad till	TITIEU 44
Gree, house h	cattai	b present			
DESCRIPTION OF	SUBSAMPLE:	0-14" 7.5	YR <i>5)</i> 4	Brown	silty sond
DESCRIPTION OF	SUBSAMPLE:	0-14" 7.5 sut mint 1	· YR 5)4	Brown h	511+ 500d
DESCRIPTION OF	SUBSAMPLE: % send 35% V. Dack Gray	0-11 7.5 Silt moist 1 Silt Sand (· YR 5)4	Brown h	511+ 500d
DESCRIPTION OF	SUBSAMPLE: % send 35% V. Dack Gray	0-11 7.5 Silt moist 1 Silt Sand (· YR 5)4	Brown h	511+ 500d
DESCRIPTION OF	SUBSAMPLE: % send 35% V. Dack Gray	0-11 7.5 Silt moist 1 Silt Sand (· YR 5)4	Brown h	511+ 500d
DESCRIPTION OF	SUBSAMPLE:	0-12" 7.5 Silt moist 1	: YR \$)4 ou coh SM) 65°	Brown h	511+, 5006 0400 2-211 350 5117
DESCRIPTION OF	SUBSAMPLE:	0-12" 7.5 Silt moist 1	: YR \$)4 ou coh SM) 65°	Brown h	511+, 5006 0400 2-211 350 5117
DESCRIPTION OF	SUBSAMPLE:	0-12" 7.5 Silt moist 1	: YR \$)4 ou coh SM) 65°	Brown h	511+, 5006 0400 2-211 350 5117
DESCRIPTION OF	SUBSAMPLE:	0-12" 7.5 Silt moist 1	: YR \$)4 ou coh SM) 65°	Brown h	511+, 5006 0400 2-211 350 5117

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Donohue	Soils D	ata Form	Soil Sam Soil Subs	ple Area <u>Vorthu</u> sample <u>WS-O</u>
Engineers & Architect	s & Scientists	Site Himro D	umpPro	oject No. <u>200</u> 6
DATE 16/23/9 TIME	D 25 DH PUCHALS ZIC SLVSSE	SKI_ R		•
SAMPLE DEPTH .	0-12"			·
PHYSICAL DESCRI L SMI) CA DONA Q WOLLER DAGE.	PTION OF SU I Southeast	BSAMPLING LOC	CATION: Ea at midpol	st shore of ut, 6" from
DESCRIPTION OF S	SUBSAMPLE: .	16 547 5/4 40/	ewish Brown	fine grained
NY OTHER CHAR	ACTERISTICS	OF NOTE:		
			· · · · · · · · · · · · · · · · · · ·	

Donohue	Soils Data Form	Soil Sample Area 👊 Soil Subsample 💆
Engineers & Architect	ts & Scientists Site Him	ro Dump Project No. 20
	O AM M PUCHALSKI RIC SLUSSER	
SAMPLE DEPTH .	0-14"	W5-07
of quarry point	1 in 4" of clear wat	GLOCATION: Southeast co
DESCRIPTION OF S Sand (SM), awy	SUBSAMPLE: 54,3/1 Ven grned trave small shells	dark gray fine grained si
	ACTERISTICS OF NOTE:	Clialit His was

Donohue	Soils Data Form	Soil Sample Area Aug Soil Subsample WS-
Engineers & Architect	s & Scientists Site Himco I	Dump Project No. 2002
DATE 10 21 90 TIME 1051 COLLECTOR TOILER	AM_ n PUCHALSKI NC SLUSSER	
SAMPLE DEPTH .	0-18"	
PHYSICAL DESCRI	ption of subsampling Lo	CATION: Northeast corn
DESCRIPTION OF S	SUBSAMPLE: 54,3/1 Very da grains, trace of small she	rk grey fine grained silty

Donohue	Soils Data Form	Soil Sample Area Oua Soil Subsample 105-
Engineers & Architects	s & Scientists Site Hime	Dump Project No. 2002
DATE 10/21/90)	
TIME 1199	AM	
	DM PIXHALSKI	
	RIC SLUSSER	
CALOUE DEDUI	0-18"	
SAMPLE DEPTH .		
•		•
-		
PHYSICAL DESCRI	PTION OF SUBSAMPLING	LOCATION: On north shore
awarm 5 foot no	orth of water orlae in ho	orsetails 0-4" growl 2 1/4-1
don't grading to g	ravery sawa 4 - 120.	· · · · · · · · · · · · · · · · · · ·
	AMOUNT INVESTOR	Crep jo jacko
DESCRIPTION OF S	UBSAMPLE: 10 YR 5/3 Br	own sainty aroundly sound (S)
DESCRIPTION OF S	UBSAMPLE: 10 YR 5/3 Br vl, Sand-angular fn to	own sainty around (S)
DESCRIPTION OF S 20% /8 // Shawy g	UBSAMPLE: 10 YR 5/3 Brown of the total	own sand arawlly sand (S)
DESCRIPTION OF S 20% /8 /Shary g	UBSAMPLE: 10 YR 5/3 Bm	own sainty around Sound Sound Sound Sound
20076 18 Shaw o	or, save -angular in the	own satisfy and Sound Sound Sound Sound Sound
20076 18 Shaw o	UBSAMPLE: 10 YR 5/3 Bm v1, sand-angular fn to ACTERISTICS OF NOTE:	own sainty around (S)
20076 18 Shaw o	or, save -angular in the	own sainty around (S)

Donohue	Soils D	ata Form		nple Area <u>Uw</u> sample <u>Wら</u> -1
Engineers & Architect	s & Scientists	Site Himco	Dumb Pr	oject No. <u>200</u>
	PM M PUCHALSE RIC SLUSSER			
SAMPLE DEPTH	0-18"		,	
PHYSICAL DESCR	IPTION OF SU Bov. Edge of	BSAMPLING LO	ocation: Mi	ddlo of we
DESCRIPTION OF S	SUBSAMPLE:	PP 104R 5/3	3 Brown fi	ne gmined e
NY OTHER CHAR	ACTERISTICS	S OF NOTE:		

	Soils Data	Form	Soil Soil	Sample Area Q Subsample 1	warn 3-11
Engineers & Architect	s & Scientists	Site Himlo	Dump	Project No. 2	009
DATE 10 21 91 TIME 143 COLLECTOR I	S B OM PUCHALSA VIC SLUSSER	<u></u>			
SAMPLE DEPTH .	0-18"				
PHYSICAL DESCRI	east of west	Shor I'	off sha	P. SOUTH STORY	
DESCRIPTION OF S	UBSAMPLE: 10	YR 5/3 Brow -si(ty (SM)	on mixad	with 54 3/ ye 1/2" stord o	1 3u/

Donohue	Soils Data Form	Soil Sample Area Quarr Soil Subsample WS-12
Engineers & Architec	ts & Scientists Site H	imco Diump Project No. 20026
DATE 10 21 9 TIME155 COLLECTOR IC	DM PUCHALSKI RIC SLUSSER	
SAMPLE DEPTH	0-18"	- •
PHYSICAL DESCR	IPTION OF SURSAMPUT	- 11 1
quarry towards	south edge of bu	NG LOCATION: South shore of yet have of steep hank
in 6 of wa	south edge of bou	lored gravel 21/2" stang. 10%
DESCRIPTION OF S	SUBSAMPLE: Multi-co	yat buse of steep hank

Donohue	Soils Data Form	Soil Sample Area South Ni Soil Subsample WS-13
Engineers & Architects	& Scientists Site Hin	ro Dump Project No. 2003
DATE 10 23 9	<u>'O</u>	
TIME	5	
COLLECTOR Z	OM PUCHALSKI RIC SLUSSER	
SAMPLE DEPTH _	0-18"	
_		
-		
PHYSICAI DESCRI	PTION OF SURSAMPI IN	G LOCATION: Southwest corn
of wetland rem	rent hear Klein prop	erty 100 north in arrisky ar
	.	
	·····	
DESCRIPTION OF S	IMPARATE IN WAR	W. D. I. Co. Tol Donal Silb
Sawl (SM) 30%	silt 70% five grai	Very Dark Gregist Proud Silts
low odi, subject, gro	as at surtain	., (
NY OTHER CHARA	ACTERISTICS OF NOTE	
ANY OTHER CHARA	ACTERISTICS OF NOTE:	
NY OTHER CHARA	ACTERISTICS OF NOTE:	

Donohue	Soils I	Data Form	Soi Soi	l Sample <i>A</i> l Subsamp	Irea Sould Uptly le US-14
Engineers & Architect	ts & Scientists	Site Him	o Dump	_ Project	No.20026.
DATE 10 23 9 TIME 141 COLLECTOR TO	B M PUCHALS SIC SWSSI	Stl ER			
SAMPLE DEPTH	0-8" - at gravel	Refusal layer			
PHYSICAL DESCR South without grade in low	IPTION OF SI PEIMMONT 19 grassy are	JBSAMPLING	LOCATION	i West of	edge of
			<u> </u>		
DESCRIPTION OF S	SUBSAMPLE:	JOYR 4/4 m	rk Ylwikla Sand 30	Brown s	Ity Sand
ANY OTHER CHAR	ACTERISTICS	S OF NOTE: _	·		
					

Donohue	Soils D	Oata Form	So So	il Sample Areas il Subsample 🗘	500 15-15
Engineers & Architec	ts & Scientists	Site Hiluco	Dump	Project No. 2	3003
DATE 10 23 COLLECTOR ICE	16 L DM PUCHAL FRIC SLUSSE	SKI R			
SAMPLE DEPTH	0-6"-R growl lay	Refusalot 101 2"shawa			
PHYSICAL DESCR	p in open an	BSAMPLING I	LOCATIOI	v: 40 yards c edge of remi	rant-
DESCRIPTION OF S	SUBSAMPLE:	10483/5 1 irn ang sud	long Dark	Grayish Brains	
ANY OTHER CHAR	ACTERISTICS	S OF NOTE: M	ethane o	dor in air	

Donohue	Soils Data Form	Soil Sample Area Soil Subsample
Engineers & Architec	cts & Scientists Site Him 10 T	Dump Project No. 200
DATE 10/03/0 TIME 2 10 COLLECTOR 1	78 455 Dr PUCHASKI EKIC SLUSSER	
SAMPLE DEPTH	0-8"	
		•
southeast w	et land remnant	
	SUBSAMPLE: 10 YR 3/1 lbn 1) 20% & grn awg sud to 2".	1 dack gravish brown
DESCRIPTION OF Silty Sand (SI Lunist, Noots	SUBSAMPLE: 10 YR 3/1 164	Anch arayish brown

APPENDIX B

APPENDIX B

WETLAND SOIL SAMPLE NUMBER	SUSPECTED WETLAND AREA LOCATION	SAMPLE CHARACTERISTICS
01	*	Dark grey silty sand. Moss at surface, roots to 3".
02	*	Light grey silty sand
03	*	Very dark grey silty sand. Refusal at gravel layer (6" below surface).
04	*	Grey silty sand; H2S odor.
05	*	Dark grey silty sand; H ₂ S odor (refusal at 20").
06	I	Yellowish brown silty sand.
07	III	Very dark grey silty sand. Trace small shells; H ₂ S odor.
08	Ш	Very dark grey silty sand. Trace small shells; H ₂ S odor.
09	ш	Brown gravelly sand.
10	III	brown fine grained sand.
11	III	Brown mixed with very dark grey silty sand H ₂ S odor in grey areas.
12	Ш	Multi-colored gravel and fine sand.
13	v	Very dark greyish brown silty sand.
14	*	Dark yellowish brown silty sand.
15	V	Very dark greyish brown silty sand.
16	V	Very dark greyish brown silty sand.

^{*} Located outside of suspected wetland area

A/R/HIMCO/AB3





DATE:

May 1, 1991

TO:

Vanessa Harris, Site Manager

CC:

Marcia Kuehl - RI Lead

Roman Gau - Project Manager

Mike Crosser - TSOAM

FROM:

Anya Kirykowicz

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J Donohue Project No. 20026.024

Himco Dump RI/FS

WATER LEVEL MEASUREMENTS

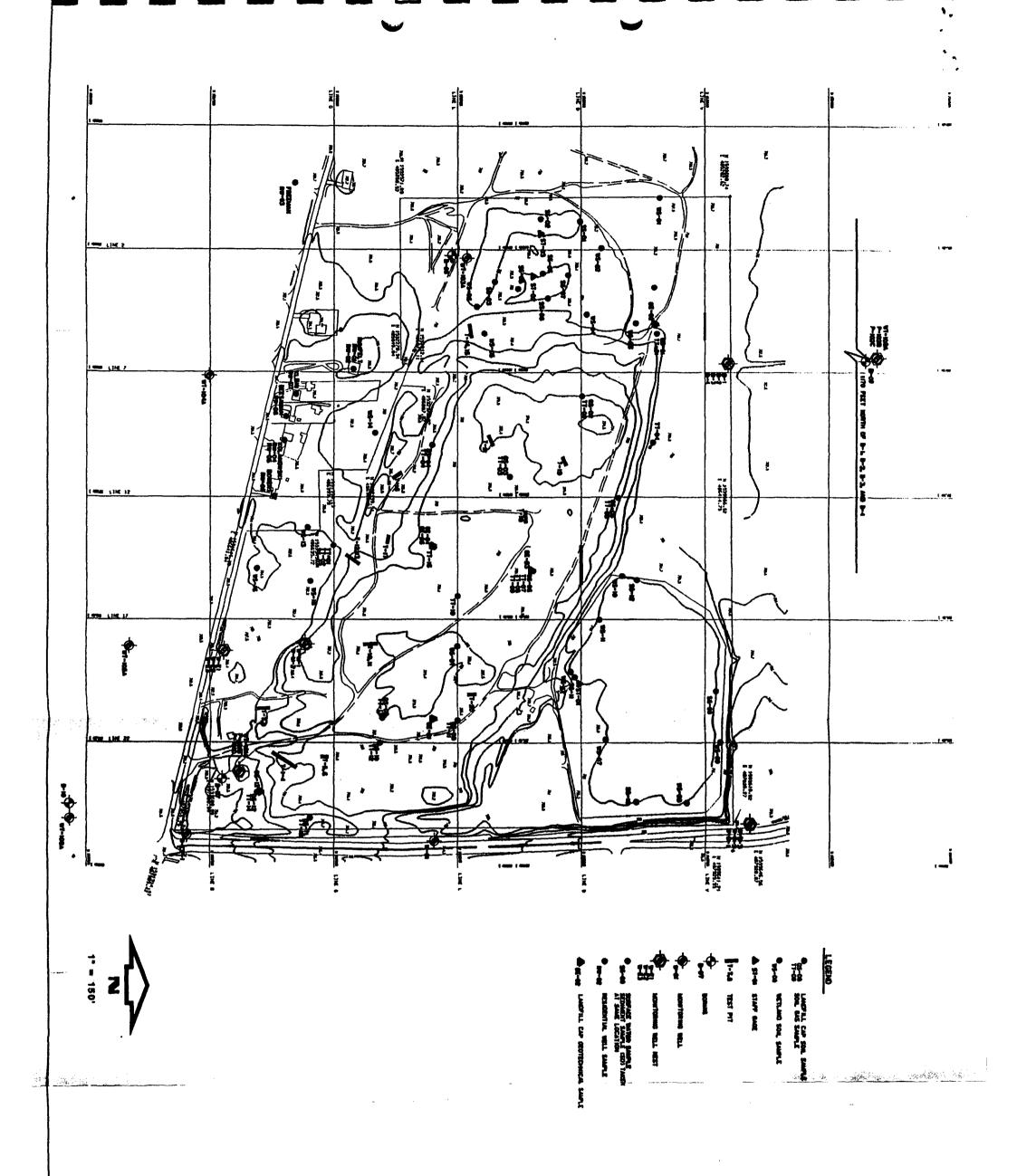
Introduction

Water level and well depth measurements were taken at the Himco Dump Site on November 6, 1990, February 1, 1991 and February 2, 1991. Static water levels were measured and recorded to determine groundwater flow directions and gradients at the site (water table elevations map). Water level and well depth measurements were also taken after installation of new wells, before and after well development and during scheduled groundwater sampling. Information concerning those measurements may be found in the respective technical memorandums. Water level and well depth measurements were conducted by Rob Cannestra, Anya Kirykowicz and Tracey Koach of Donohue & Associates, Inc. Well locations are shown in Figure 1.

Methods

Section 4.2.3.3 and Section 4.2.3.4 of the Final Field Sampling Plan, Himco Dump RI/FS, Elkhart, Indiana, described water level, well depth measurements and decontamination procedures. The water level surface was measured using poppers and electronic water level indicators. Each well had a reference point on top of the PVC well casing, from which water level measurements were taken. Measurements were noted to the nearest 0.01 feet. Each well was surveyed with respect to mean sea level elevation with an accuracy of 0.01 feet. Water level, well depth and staff gauge measurements were made within a 24-hour period.

The poppers and electric water level indicators were decontaminated between wells using an Alconox soap and tap water wash, tap water rinse, isopropanol rinse and two deionized or distilled water rinses. The isopropanol rinses were captured in a 5-gallon bucket and covered for discharge into the on-site frac tank.



MAY 1991

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FIGURE 1 SITE LOCATION MAP (TECHNICAL MEMO)

HIMCO DUMP SUPERFUND SITE ELKHART, INDIANA DONONUC ENGINEERS
ARCHITECTS
SCIENTISTS

APPENDIX A WATER LEVEL MEASUREMENT AND ELEVATIONS

Deviations

Distilled water rinses were used during decontamination procedures in addition to deionized water.

Summary of Results

Water level measurement forms are attached in Appendix A.

AK:lh

A/R/HIMCO/AC0

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TECHNICAL MEMORANDUM - NO. 17

DATE: November 1, 1991

TO: Vanessa Harris, Site Manager

CC: Mansour Ghiasi, RI Lead Roman Gau, Project Manager

Mike Crosser, TSQAM

FROM: Anya Kirykowicz

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093

EPA Work Assignment No. 17-5L4J

Himco Dump RI/FS

Donohue Project No. 20026.024

HEALTH AND SAFETY

Introduction

Donohue & Associates, Inc., conducted field work from October 1990 to January 1991 and from September 1991 to October 1991 at the Himco Dump Superfund site in accordance with the Final Field Sampling Plan, Himco Dump RI/FS, Elkhart, Indiana - 1990 and the Addendum I, Phase II Work Plan, Himco Dump Remedial Investigation/Feasibility Study - August 1991, respectively. Personnel entering the site followed the protocols established in the Health and Safety Plan, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana, Final July 1990 (HASP, 1990) and the Final Addendum I Health and Safety Plan, Himco Dump Remedial Investigation/Feasibility Study, Phase II, Elkhart, Indiana - August 1991 (Addendum I, 1991).

Methods

As outlined in Section 1.0 of the HASP, 1990, the plan was prepared in accordance with the ARCS V Program Health and Safety Guideline HAS-1 and the regulatory requirement of 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." The HASP, 1990 was implemented during Phase I activities. The following tasks were completed during Phase I: sediment and surface water sampling, trenching, soil boring/monitoring well installation, soil sampling, staff gauge installation, waste mass gas sampling, wetland identification, monitoring well development, slug tests, groundwater sampling, survey, and geophysical survey.

During Phase II activities, the HASP, 1990 and Addendum I, 1991 were implemented. Tasks completed during Phase II were: trenching, soil boring/monitoring well installation, wetland delineation, soil sampling, groundwater sampling, leachate sampling, sediment and surface water sampling. Addendum I, 1991 addresses safe boating practices for the collection of sediment and surface water samples.



Deviations

There were no deviations from the HASP, 1990 and the Addendum I, 1991, except for reassignment of staff listed in the project organization.

Summary Results

The HASP, 1990 and Addendum I, 1991 were adhered to by staff from the following: Donohue and Associates, Inc.; John Mathes & Associates; Life Systems, Inc.; Lang, Feeney & Associates, Inc.; Engineering-Science, Inc.; STS Consultants, Ltd.; United States Environmental Protection Agency; and the Indiana Department of Environmental Management.

A/R/HIMCO/AH7